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ENVIRONMENTAL ASSESSMENT FOR THE OIL AND GAS INDUSTRY CONSERVATION PLAN ASSOCIATED WITH ISSUANCE OF ENDANGERED SPECIES ACT SECTION 10(A)(1)(B) PERMITS FOR THE AMERICAN BURYING BEETLE IN OKLAHOMA

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1.0 INTRODUCTION, NEED, AND PURPOSE

The U.S. Fish and Wildlife Service (Service) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] 4321 *et seq*.), as amended, and its implementing regulations in the Code of Federal Regulations (CFR) at 40 CFR §§ 1500, and section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended (16 USC § 1532). This EA has evaluated the impacts of, and alternatives to implementation of the proposed Oil and Gas Industry Conservation Plan (ICP) that has been prepared to support incidental take permits for the federally listed American burying beetle (ABB) (*Nicrophorus americanus*) resulting from activities associated with geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products and maintenance, operation, repair, and decommissioning of oil and gas pipelines and well field infrastructure (referred to as covered activities). In summary, this EA provides an evaluation of potential impacts on the human environment resulting from implementing the proposed ICP, including avoidance and conservation measures described in the ICP.

The ICP is a habitat conservation plan prepared by the Service for covered activities within the proposed Planning Area, in which federally listed or protected species are known, or are likely to occur. Should the ICP be approved, individual oil and gas companies would apply for an ESA 10(a)(1)(B) permit for incidental take of the ABB associated with activities covered in the ICP and agree to comply with the terms and conditions of the ICP. In the ICP, the Service has defined incidental take in terms of the number of acres of occupied ABB habitat disturbed by covered activities.

The proposed ICP Planning Area consists of 45 counties in Oklahoma. They are as follows: Adair, Atoka, Bryan, Carter, Cherokee, Choctaw, Cleveland, Coal, Craig, Creek, Delaware, Garvin, Haskell, Hughes, Johnston, Kay, Latimer, Le Flore, Lincoln, Love, Marshall, Mayes, McClain, McCurtain, McIntosh, Murray, Muskogee, Noble, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, Wagoner, and Washington (Figure 1-1). The Planning Area covers approximately 22,858,163 acres (9,250,370 hectares) or 35,716 square miles (92,504 square kilometers).

This document provides the required NEPA documentation for a Federal action (approval of a conservation plan and subsequent section 10(a)(1)(B) permit issuance), providing baseline information and discussion of impacts to the human and natural environment that may occur as a result of implementing the ICP and potentially resulting from the covered activities during the ICP term.

Figure 1-1

The ICP Planning Area

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1.1 PURPOSE AND NEED

This EA has been prepared to provide an assessment of potential impacts resulting from the proposed Federal action (approval of the ICP and subsequent issuance of incidental take permits) on the human and natural environment.

1.1.1 Purpose for the Proposed Action

The purpose of the proposed action is to provide a means by which applicants and the Service can streamline the ESA compliance process for non-Federal projects with the potential to impact the federally listed ABB within a defined area. Expediting the process would allow the Service to process incidental take permits in an expedited fashion, while meeting industry needs for an expedited ESA compliance.

1.1.2 Need for the Proposed Action

The Service's need for the ICP is to provide a mechanism under which we can issue permits to cover unavoidable take of ABB by a non-Federal entity engaging in otherwise lawful activities in an expedited fashion to reduce work load on Federal employees and meet industry scheduling requests. Implementing the ICP would eliminate need for processing multiple, individual Habitat Conservation Plans (HCPs) and ensures consistent mitigation and minimization measures for the ABB related to oil and gas activities. Processing HCP requests requires review of each applicant's conservation plan in addition to review of avoidance, minimization, and mitigation measures for each individual project, preparation of appropriate NEPA documentation, analysis under an intra-Service consultation, and coordination through multiple Service offices.

The oil and gas industry's need for incidental take authorization occurs when the likelihood exists that the federally listed ABB could be taken, as that term is defined by the Endangered Species Act of 1973 (ESA) by a covered activity and project schedules and budgets are impacted by lengthy field surveys, compliance coordination, and identification of appropriate mitigation. The proposed ICP and subsequent consideration of incidental take permits would streamline and expedite the ESA compliance process for industry applicants.

2.0 ALTERNATIVES

An EA examines the impacts of a proposed Federal action on the human environment. In this case, the Proposed Action is approval of the ICP and subsequent issuance of permits to authorize incidental take of the covered species that may result from the covered activities.

With respect to this EA, the Service has analyzed in detail the Proposed Alternative and the No-Action Alternative. The No-Action alternative demonstrates the consequences of not approving the ICP or issuing subsequent permits.

2.1 NO-ACTION ALTERNATIVE

No incidental take permits would be issued under the proposed ICP. Oil and gas companies in Oklahoma within the range of the ABB would comply with the ESA by avoiding impacts (take) to the covered species where practicable. If take could not be avoided and a Federal nexus exists (funded, authorized, or carried out by a Federal agency), an operator or individual may receive take coverage through consultation and a biological opinion issued by the Service to the Federal action agency. If no Federal involvement exists, applicants or individuals could develop an HCP and apply for incidental take authorization from the Service on a project-by-project basis. Each application would require independent evaluation under NEPA.

2.2 PROPOSED ALTERNATIVE: ACTIVITIES AS PROPOSED IN THE ICP

The proposed action is approval of the proposed ICP, subsequent issuance of incidental take permits for covered species within the 22-year term of the ICP, and implementation of the ICP as proposed. Actions covered under the ICP may result in take of covered species (the ABB) associated with activities including, but not limited to exploration, development, and extraction (upstream production); and transport and/or distribution (midstream development) of crude oil, natural gas, and other petroleum products (described below and within Section 2 of the ICP). Some overlap may occur between these two categories and different Federal agencies may define “upstream” and “midstream” differently to the definition in the ICP. For a complete description of the covered activities, see Section 2 of the ICP.

2.2.1 Upstream Production

Upstream production, as defined by the ICP, includes activities associated with oil, natural gas, and other petroleum products and development of the infrastructure required to extract those resources. Covered activities include geophysical exploration (also known as seismic exploration), which is the process of locating oil and gas deposits beneath the earth’s surface. This involves generating seismic waves and measuring their reflectance through differing geologic structures.

These seismic waves may be initiated by detonating explosives or through a process known as "land vibroseis." Reflected seismic waves are recorded and interpreted to characterize subterranean landforms. Seismic companies often design sound generation points to avoid identified sensitive habitats and hazards and still collect meaningful data.

Covered activities also include construction, operation, and maintenance of new and existing well field infrastructure and decommissioning of obsolete facilities, including:

- Well pads
- Drilling and completion activities
- Wells
- Gas flaring
- Work and access roads
- Electric distribution lines
- Offsite impoundments
- Communication towers

Actions common to these activities include vegetation clearing; removal and grading of soils; use of heavy machinery and off-road vehicles; drilling wells and hydraulic fracturing, increased levels of noise; installation of or modification to fencing, walls, and roads; increased lighting; and increased human activity in the area. It should be noted that although electric transmission and distribution facilities not related to oil and gas facilities were previously eliminated from consideration, the Service determined that electric distribution lines 34.5 kV or less associated specifically with oil and gas facilities should be included in the ICP so that industry impacts related to exploration, extraction, and transport are covered.

Commonly used, hydraulic fracturing for oil and gas drilling is the fracturing of rock by a pressurized liquid where water and a proppant (typically treated sand added to a fracturing fluid [gel, foam, or slickwater – water with a limited amount of sand, friction reducers, and other chemical additives]) are pumped at extremely high pressures down the wellbore to keep an induced hydraulic fracture open. Oil and gas company personnel continuously monitor and gauge pressures, fluids and proppants, studying how the sand reacts when it hits the bottom of the wellbore, slowly increasing the density of sand to water as the process progresses. This process may be repeated multiple times, in "stages" to reach maximum areas of the formation(s). The wellbore is temporarily plugged between each stage to maintain the highest fluid pressure possible and get maximum fracturing results in the rock. The plugs are then drilled or removed from the wellbore and the well is tested for results. The pressure is reduced and the fracturing fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the fractures and allow the oil/gas to flow.

The Service determined that all of the described activities should be covered by the ICP and subsequent incidental take permit(s) with the following restrictions:

- Gas flaring (burning waste gases for disposal) with adequate flame enclosure—projects requiring small, constantly burning flares throughout the life of the project will cover the flame to minimize or eliminate emitted artificial light, which is attractive to birds and ABBs.
- Electric distribution lines must be 34.5 kilovolts or less—the limit on kilovolts is associated with the height of the lines and risk of bird strikes. Lines under 34.5 kilovolts are less likely to result in bird strikes.
- Communication towers must be under 200 feet (61 meters), unlit (unless required by the Federal Aviation Administration), and with no guy wires—this restriction is associated with the risk of impacts to federally protected bird species. Taller towers have increased risk of bird strikes and elimination of guy wires further reduces the risk. Additionally, if Federal Aviation Administration regulations permit, towers should be unlit to avoid attracting migratory birds at night. These restrictions are consistent with those outlined in the Service's standard guidance for towers with potential impacts to federally listed species and migratory birds. Industry indicated that they rarely need towers taller than 200 feet (61 meters) and if, needed, they would be permitted through Federal Aviation Administration and with the Service independent of the ICP.

These activities, with restrictions, are included as part of the proposed action. Table 2-1 summarizes the subactivities, components, and actions associated with upstream production activities within the proposed Planning Area. These activities are explained in detail in the ICP.

2.2.2 Midstream Development

Midstream development, as defined in the ICP, includes gathering, processing and treatment, transmission, and/or distribution of crude oil, natural gas, or other petroleum products. Petroleum products may include unprocessed natural gas liquid or condensate streams (including methane, ethane, propane, butane, and pentane). Refined oil products including gasoline, diesel, and kerosene may also be transported via pipeline. Pipelines located within the boundaries of well pads are included in upstream production, while gathering, transmission, and distribution pipelines are considered midstream development. Covered activities associated with midstream development include the following:

- Construction of gathering, transmission, and distribution pipelines
- Construction of associated surface facilities, including:
  - Access roads
  - Booster, compressor, and pump stations
  - Meter stations, mainline valves, pig launchers/receivers, regulator facilities, and other required facilities
  - Natural gas processing and treatment facilities

  - Communication towers
  - Electric distribution lines
  - Electric substations
- Operation and maintenance of pipeline and associated surface facilities
- Decommissioning and reclamation of pipeline and associated surface facilities

Actions common to these activities are similar to those described for upstream production activities. The Service determined that all of the above-listed activities would be covered by the ICP and incidental take permit(s). Table 2-2 summarizes the subactivities, components, and actions associated with midstream development activities within the proposed Planning Area. These activities are explained in detail in the ICP.

TABLE 2-1
SUMMARY OF UPSTREAM PRODUCTION ACTIVITIES WITHIN THE ICP PLANNING AREA

Subactivity	Components	Actions
Geophysical exploration (seismic exploration)	Land vibroseis – seismic waves generated from a truck-mounted vibrator plate Explosives that are detonated in holes drilled below the surface or land	• Drilling • Construction of roads • Vegetation clearing • Use of heavy machinery and off-road vehicles • A truck-mounted vibrator plate is placed on the ground and a heavy weight is dropped on it to create seismic waves • Use of explosives
• Construction • Operation • Maintenance • Reclamation of well field infrastructure	• Well pads • Drilling and completion activities • Gas flaring (with adequate flame enclosure on small, constantly burning flares as described in the ICP) • Work and access roads • Electric distribution lines (34.5 kilovolts or less) • Offsite impoundments • Communication towers (under 200 feet (61 meters), unlit–unless required by FAA, no guy wires)	• Vegetation clearing • Vegetation disposal • Grading to level sites • Construction and maintenance of roads • Addition of gravel and other materials • Construction of reserve pits, trenches, sumps, ditches, culverts, and other features • Installation of erosion and sediment control features • Use of heavy machinery and off-road vehicles • Drilling and hydraulic fracturing • Flaring of gas for disposal or as pressure release • Installation of or modification to fencing, walls, roads, lighting • Surface water pumping • Scraping of topsoil • Revegetation • Restoration of lands • Herbicide application • Replacement of distribution poles • Removal of distribution lines and poles

TABLE 2-2
SUMMARY OF MIDSTREAM DEVELOPMENT ACTIVITIES WITHIN THE ICP PLANNING AREA

Subactivity	Components	Actions
Construction of gathering, transmission, and distribution pipelines	• Trenching • Spoil piles • Pipeline assembly • Vehicle traffic	• Vegetation clearing • Vegetation disposal • Vegetation reestablishment (seeding) • Grading to level sites • Backfilling and finish grading • Use of heavy machinery and off-road vehicles • Construction of trenches • Location of underground utilities (i.e., cables, conduits, and pipelines) • Installation of erosion and sediment control measures • Post-construction revegetation • Topsoil segregation • Hydrostatic testing • Surface water pumping • Installation or modification to fencing, gates, roads, driveways • Installation of pipeline markers and/or warning signs • Horizontal directional or conventional drilling at roads, railroads, water crossings, or other sensitive areas

TABLE 2-2 (Cont'd)

Subactivity	Components	Actions
Construction of associated surface facilities	• Access roads • Booster, compressor, and pump stations • Meter stations, mainline valves, pig launchers/ receivers, regulator facilities, and other required facilities • Natural gas processing and treatment facilities • Communication towers (under 200 feet, unlit–unless required by FAA, no guy wires) • Electric distribution lines (34.5 kilovolts or less) • Electric substations	• Construction of roads • Construction of culverts, ditches, and trenches • Vegetation clearing • Grading to level sites • Office/control/utility and storage/maintenance buildings and parking areas may be required • Addition of gravel or other materials • Installation of lighting and security and perimeter fencing • Facilities including filter/separator, miscellaneous valves, sumps, tanks, yard piping pipeline markers, cathodic protection system components, offices, storage buildings, and sheds • Addition of hard surfaces • Use of heavy machinery and off-road vehicles • Construction of distribution lines and poles
Operation and maintenance of pipeline and associated surface facilities	• Visual inspections • Pipeline integrity • Emergency (unplanned) repairs	• Use of heavy machinery and off-road vehicles • Minor soil disturbances • Digging and exposing pipeline • Pipeline replacement • Pole replacement • Vegetation clearing • Vegetation maintenance • Herbicide application • Adding additional gravel or other materials • Dust suppression (watering)
Decommissioning and reclamation of pipeline and associated surface facilities	• Removal of associated surface facilities • Dismantle and remove pipelines • Pipelines capped and grouted	• Vegetation restoration • Minor soil disturbances • Use of heavy machinery and off-road vehicles • Excavating to expose pipeline for removal • Cutting and removing pipe • Backfilling and reclaiming the area • Removal of distribution lines and poles

3.0 AFFECTED ENVIRONMENT

The ICP Planning Area is a 45-county area covering approximately 22,858,163 acres (9,250,370 hectares) or 35,716 square miles (92,504 square kilometers) and 10 ecoregions in Oklahoma, 2 major river basins (Arkansas River and Red River), and many aquifers. Land use ranging from undeveloped land to agricultural land to urban development is present in the Planning Area, as well as numerous national wildlife refuges, wildlife management areas, state parks and other preserved lands. The population in the Planning Area is approximately 2,317,969 persons (U.S. Census Bureau 2010), and the largest cities in the Planning Area are Tulsa and Norman in Oklahoma.

Because of its vast size, the Planning Area displays significant diversity in habitat, resources, and degrees of urban development. Not all of the resources located within the Planning Area would potentially be affected by the covered activities. Thus, this EA briefly describes the existing resources within the Planning Area, focusing primarily on those with the potential to be affected by the Proposed Alternative.

3.1 GEOLOGY

The following description of Oklahoma's geology is from the Oklahoma Geological Survey (2008). Parts of Oklahoma in the geologic past were alternately below or above sea level. Thick layers of sediments accumulated in shallow seas that covered large areas. The sediments were later buried and lithified into marine shales, limestones, and sandstones over geologic time. In areas near the ancient seas, sands, and clays accumulated as alluvial and deltaic deposits that subsequently were lithified to sandstones and shales. When the areas were later elevated above the seas, rocks, and sediments that had been deposited earlier were exposed and eroded. Uplift was accomplished by the gentle arching of broad areas, or by mountain building where rocks were intensely folded, faulted, and thrust upward.

The principal mountain belts, the Ouachita, Arbuckle, and Wichita Mountains, are in the southern third of Oklahoma. These were the sites of folding, faulting, and uplifting during the Pennsylvanian Period. The mountain belts exposed a great variety of geologic structures and brought igneous rocks and thick sequences of Paleozoic sedimentary strata to the surface.

The principal sites of sedimentation were elongate basins that subsided more rapidly than adjacent areas, and received 10,000 to 40,000 feet of sediment. Major sedimentary basins were confined to the southern half of Oklahoma and include Anadarko, Arkoma, Ardmore, Marietta, Hollis, and Ouachita; the Ouachita Basin is the site of today's Ouachita Mountains, and was active from Late Cambrian to Early Pennsylvanian. A smaller basin, the Dalhart Basin, is in the western Panhandle.

3.2 SOILS, INCLUDING PRIME AND UNIQUE FARMLAND

Soil descriptions provided for the Planning Area are based on regional soil types for Oklahoma. The following description of the soil in Oklahoma is from the Oklahoma Geological Survey (2008), including information from Gray and Galloway (1959) and Carter and Gregory (1996). The major soil associations are broken down by geographic regions and Major Land Resource Areas.

3.2.1 Central Oklahoma

Soils in the Central Rolling Red Prairies are dark and loamy with clayey to loamy subsoils developed on Permian shales, mudstones, sandstones, and/or alluvial deposits under tall grasses. Soils of the Cross Timbers are light colored, sandy with reddish subsoils on various sandy materials developed under mostly post oak, blackjack oak, and some hickory forests with prairie openings (savannah). The Bluestem Hills-Cherokee Prairies contain deep, dark-colored soils, mostly with clay subsoils developed on shales, sandstones, and limestones under tall grasses. Soils in the Grand Prairie-Arbuckle Mountains Major Land Resource Areas are dark and loamy to clayey with subsoils developed in shales and limestones under tall grasses near the Arbuckle Mountains and southeastern Oklahoma. Thin and stony soils develop on Precambrian granites in the Arbuckle Mountains beneath mid grasses, scrub oaks, cedars, and shrubs.

3.2.2 Eastern Oklahoma

The Ozark Highlands-Boston Mountains have brown to light-brown, silty soils with reddish clay subsoils on cherty limestones (Ozark Highlands) and sandstones and shales (Boston Mountains). These soils develop under oak-hickory-pine forests and tall grasses. Soils in the Ouachita Mountains are light colored, acidic, sandy, and loamy with clayey subsoils developed on sandstones and shales under oak-hickory-pine forests. Arkansas Ridge and Valley soils are loamy, rocky, and well drained where developed on steep slopes and ridges or are very deep and loamy on gentle slopes and shales in valleys. Coastal Plain soils are light colored, acidic, and sandy with clay loam to clay subsoils developed mostly on sandstones under pine-oak (east) and oak-hickory (west) forests.

3.2.3 Prime Farmland Soils

Prime farmland is defined by the Secretary of Agriculture in 7 CFR 657 as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, or oilseed and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to economically sustain high yields of crops when treated and managed properly (Soil Conservation Service 1978). Some soils are considered prime farmland in their native state, while others are considered potential prime farmland or prime farmland if they are drained or irrigated in order to grow the main crops in the area.

The amount of acreage considered to be prime farmland in the 45 Oklahoma counties of the Planning Area ranges from 55,305 acres (22,381 hectares) in Marshall County to 416,419 acres (168,519 hectares) in Osage County; by percentage of land in any given county, prime farmland ranges from 8.8 percent of the county's soil in Pushmataha County, up to 68.3 percent prime farmland in Craig County (Natural Resources Conservation Service 2013).

3.3 WATER RESOURCES

Oklahoma can be divided into two major river systems, the Arkansas River and Red River. A tally of larger streams and tributaries within each river systems totals 20, with 5,171 linear miles (8,322 kilometers) of river and stream length throughout the state. A total of 116 major reservoirs occur in Oklahoma, 84 of which occur in the Planning Area. Numerous artificial and natural ponds and smaller lakes are also found throughout the Planning Area (Oklahoma Water Resources Board 2012).

The Planning Area covers 7 of 11 major aquifers and 8 of 13 minor alluvial aquifers in Oklahoma. The major alluvial aquifers include the Arkansas River, Canadian River, Gerty Sand, North Canadian River, Red River, Salt Fork of the Arkansas River, and Washita River aquifers. In addition, the Planning Area includes 5 of 10 major, and 14 of 19 minor bedrock aquifer in Oklahoma. The major bedrock aquifers consist of the Antlers, Arbuckle-Simpson, Garber-Wellington, Roubidoux, and Vamoosa-Ada aquifers (Oklahoma Water Resources Board 2012).

The 100-year floodplains in the Planning Area are associated with numerous rivers and creeks and are typically relatively low, flat areas. Floodplains form where overbank floodwaters spread out laterally and deposit fine-grained sediments. The Federal Emergency Management Agency prepares Flood Insurance Rate Maps that delineate floodplains for counties that participate in the program. Not all counties participate in the Federal Emergency Management Agency program (Federal Emergency Management Agency 2013).

3.4 WATER QUALITY

Surface water quality throughout the Planning Area ranges from poor to good, with surface waters impaired by elevated levels of total dissolved solids, chloride, sulfate, and chlorophyll-a. In general, Oklahoma's major aquifers contain water of acceptable quality for irrigation of at least some crops. The state's major aquifers provide water supplies that generally meet or exceed Federal and State standards for drinking water; however, not all areas or depths within the aquifers provide water suitable for public supply. Water from alluvial aquifers, though typically very hard, is generally of good quality and is acceptable for most purposes (Oklahoma Water Resources Board 2012).

3.5 AIR QUALITY

The Clean Air Act identifies six common air pollutants found all over the U.S. These pollutants can injure health, harm the environment, and cause property damage. The U.S. Environmental Protection Agency calls these pollutants criteria air pollutants and has developed scientifically based health criteria as the basis for setting permissible levels. National ambient air quality standards exist for each of the criteria pollutants and these standards apply to the concentration of a pollutant in outdoor air. If the air quality in a geographic area meets or does better than the national standard, it is called an attainment area and areas that do not meet the national standard are called nonattainment areas. The Planning Area is currently in attainment for all air quality criteria pollutants in all relevant counties (U.S. Environmental Protection Agency 2012).

3.6 VEGETATION

Of the 12 Level III ecoregions that have been described by Woods et al. (2005) for Oklahoma, 10 occur within the Planning Area. They are as follows: Central Great Plains (CGP), Flint Hills (FH, Cross Timbers (CT), East Central Texas Plains (ECTP), South Central Plains (SCP), Ouachita Mountains (OM), Arkansas Valley (AV), Boston Mountains (BM), Ozark Highlands (OH), and Central Irregular Plains (CIP). A summary of the dominant plant species associated with these ecoregions is shown in Table 3-1. The vegetation descriptions below are predominantly from Woods et al. (2005) and Oklahoma Geological Survey (2008).

Vegetation varies widely depending on the climactic and topographic elements that characterize each area. The western boundary of the Planning area includes scattered hills, breaks, salt plains, low mountains, gypsum karst, sandy flats, and sand dunes to low hills, cuestas, ridges, and plains that separate the forests of the east from the drier prairies of the west. Mean annual rainfall increases eastward, and varies from about 36 to 46 inches (91.4 to 116.8 centimeters). Topography on the eastern side of the Planning Area is more varied, ranging from low hills, cuestas and plains in the north to highly dissected plateau and mountains centrally, and low mountains and prairie in the south. Rainfall on the eastern boundary of the Planning Area ranges from 41 to 57 inches (104.1 to 144.8 centimeters) per year. The terrain and vegetation on the western portion of the Planning Area are transitional between the less-rugged, grass-covered ecoregions to the west and the hilly, oak savannah to the east.

TABLE 3-1
DOMINANT PLANT SPECIES IN THE ECOREGIONS WITHIN THE ICP PLANNING AREA[1]

		Level III Ecoregion[2]									
Scientific Name	Common Name	CGP	FH	CT	ECTP	SCP	OM	AV	BM	OH	CIP
Herbaceous											
Amorpha canescens	Lead plant	X									
Arnoglossum spp.	Indian plantain	X									
Andropogon gerardii	Big bluestem	X	X		X						
Bouteloua curtipendula	Side-oats grama		X								
Bouteloua gracilis	Blue grama		X								
Bouteloua hirsuta	Hairy grama		X								
Dalea spp.	Prairie clover	X									
Dicanthelium spp.	Small panic grass	X									
Echinacea spp.	Coneflower	X									
Opuntia spp.	Pricklypear		X								
Panicum virgatum	Switchgrass	X	X		X						
Schizachyrium scoparium	Little bluestem	X	X	X	X						
Solidago missouriensis	Missouri goldenrod	X									
Sorghastrum spp.	Indiangrass	X	X								
Symphyotrichum ericoides	Heath aster	X									
Trees											
Acer spp.	Maple					X		X	X	X	X
Betula spp.	Birch					X			X	X	X
Carya alba	Mockernut hickory								X		
Carya aquatica	Water hickory					X					
Carya illinoinensis	Pecan							X			
Carya cordiformis	bitternut hickory								X		
Carya texana	Black hickory			X				X	X		X
Carya spp.	Hickories					X	X	X		X	X
Celtis spp.	Hackberries		X					X			
Fraxinus pennsylvanica	Green ash					X		X			
Juglans nigra	Black walnut							X			
Juniperus virginiana	Eastern red cedar	X									
Liquidamber styraciflua	Sweetgum					X		X			
Pinus echinata	Shortleaf pine					X	X			X	X
Pinus taeda	Loblolly pine					X					
Platanus sp.	Sycamore				X	X		X	X	X	X
Populus spp.	Cottonwood		X		X			X	X		
Quercus alba	White oak					X		X	X	X	X
Quercus falcata	Southern red oak					X					
Quercus lyrata	Overcup oak					X					
Quercus macrocarpa	Bur oak							X			

TABLE 3-1 (CONT'D)

Scientific Name	Common Name	Level III Ecoregion[2]									
		CGP	FH	CT	ECTP	SCP	OM	AV	BM	OH	CIP
Quercus marilandica	Blackjack oak			X					X	X	X
Quercus muehlenbergii	Chinquapin oak							X	X		
Quercus nigra	Water oak					X					
Quercus phellos	Willow oak					X					
Quercus rubra	Northern red oak							X			
Quercus shumardii	Shumard oak					X					
Quercus stellata	Post oak			X					X	X	X
Quercus velutina	Black oak									X	X
Quercus spp.	Oaks	X	X				X	X			
Salix sp.	Willow				X	X		X	X		X
Ulmus alata	Winged elm									X	X
Ulmus americana	American elm					X				X	X
Ulmus spp.	Elms	X	X		X			X	X		
Taxodium distichum	Bald cypress					X					

[1] According to Woods et al. (2005) and Oklahoma Geological Survey (2008).

[2] CGP–Central Great Plains; FH–Flint Hills; CT–Cross Timbers; SCP–South Central Plains; OM–Ouachita Mountains; AV–Arkansas Valley; BM–Boston Mountains; OH–Ozark Highlands; CIP–Central Irregular Plains.

3.7 WETLANDS/WATERS OF THE U.S.

Section 10 (33 USC 403) of the Rivers and Harbors Act of 1890 (superseded) and 1899 (33 USC 401, et seq.) established permit requirements for certain activities affecting navigable waters of the U.S. Navigable waters of the U.S. are defined (33 CFR Part 329) as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce." Furthermore, Section 404 of the Clean Water Act (33 USC 1344) provided regulatory authority to the U.S. Army Corps of Engineers (USACE) for activities involving the discharge of dredged or fill material into waters of the U.S., including wetlands. Some of the wetland habitats described below may be subject to regulation by the USACE.

The USACE (1982) describes wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." The USACE provides guidelines for the determination of the areas under Section 404 jurisdiction (Environmental Laboratory 1987). These guidelines require that at least one positive indicator for each of three criteria (hydrophytic vegetation, hydric soils, and wetland hydrology) exist in order to designate an area as a wetland. The numerous and varied indicators for each of the criteria are described in detail in the guidelines.

If these areas meet the criteria necessary (Environmental Laboratory 1987) to define them as jurisdictional wetlands pursuant to Section 404 of the Clean Water Act, certain activities (e.g., placement of fill) within these areas would be subject to USACE regulation. The Planning Area encompasses the USACE Tulsa District.

Freshwater wetlands are classified as riverine (rivers, streams, and creeks), lacustrine (lakes and reservoirs), and palustrine (forested, scrub-shrub, and emergent wetlands and ponds) (Cowardin et al. 1979). All of these occur within the Planning Area. Bottomland hardwood forests can contain a variety of species of trees, shrubs, and vines. Bogs are a type of wetland sometimes found in association with bottomland hardwood forests. Bogs are peat-accumulating wetlands that have no significant inflows or outflows. Wetland functions include biological productivity, fish and wildlife habitat, water quality improvement, aesthetics, and floodwater storage (U.S. Environmental Protection Agency 2001).

3.8 GENERAL WILDLIFE

The Planning Area contains at least a portion of four of the five biotic provinces within Oklahoma that were described by Blair (1950): the Texan, Carolinian, Kansan, and Austroriparian biotic provinces; the Navahonian biotic province occurs outside of the Planning Area. The Texan Biotic Province occupies the majority of the Planning area and is in the central portion, while the Carolinian Biotic Province occupies the eastern portion. The Kansan Biotic Province clips the northwestern corner of the Planning Area and the Austroriparian Biotic Province occurs in the southeastern corner.

The fauna represented in each of these areas corresponds to distinctive vegetational, climactic, and elevational variations that characterize the region. At least 80 species of amphibians and reptiles occur in the Planning Area, including frogs, toads, salamanders, turtles, skinks, lizards, and snakes (Conant and Collins 1998). Representative species are listed in Table 3-2 by biotic province. More than 300 avian species occur in the Planning Area, including passerines, (e.g., warblers, wrens, sparrows, crows), waterfowl (e.g., geese, ducks), wading birds, and raptors (Sibley 2000). Representative common avian species, by biotic province, are shown in Table 3-3.

Numerous species of mammals occur in the Planning area, including deer, coyotes, bobcats, river otters, raccoons, opossums, armadillos, rabbits, squirrels, skunks, mice, and rats (Caire et al. 1989, Wilson and Ruff 1999, American Society of Mammalogists 2014). Representative species are listed in Table 3-4 by biotic province. Gamefish species include bass, crappie, walleye, catfish, paddlefish, and alligator gar, but many nongame and small-bodied fish also occur in the Planning Area, as well (Jester et al. 1992, Miller and Robison 2004, Oklahoma Department of Wildlife Conservation 2014). Table 3-5 lists representative fish species found in each of the biotic provinces within the Planning Area.

TABLE 3-2
REPRESENTATIVE AMPHIBIAN AND REPTILE SPECIES IN THE
BIOTIC PROVINCES WITHIN THE ICP PLANNING AREA[1]

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
FROGS AND TOADS					
Eastern cricket frog	*Acris crepitans crepitans*	X	X	X	X
Dwarf American toad	*Anaxyrus americanus charlesmithi*	X	X	X	X
Eastern green toad	*Anaxyrus debilis debilis*	X			
Red-spotted toad	*Anaxyrus punctatus*	X		X	
Texas toad	*Anaxyrus speciosus*	X			
Woodhouse's toad	*Anaxyrus woodhousii*	X	X	X	X
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*	X	X		X
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*	X	X	X	
Bird-voiced treefrog	*Hyla avivioca*				X
Cope's gray treefrog	*Hyla chrysoscelis*	X	X	X	X
Green treefrog	*Hyla cinerea*	X	X		X
Gray treefrog	*Hyla versicolor*	X	X	X	X
Northern crawfish frog	*Lithobates areolatus circulosus*	X	X		
Plains leopard frog	*Lithobates blairi*			X	
American bullfrog	*Lithobates catesbeianus*	X	X	X	X
Bronze frog	*Lithobates clamitans clamitans*	X			X
Northern green frog	*Lithobates clamitans melanota*	X	X		
Pickerel frog	*Lithobates palustris*	X	X		X
Spotted chorus frog	*Pseudacris clarkii*	X	X	X	X
Spring peeper	*Pseudacris crucifer*		X		X
Upland chorus frog	*Pseudacris ferarium*	X	X		X
Strecker's chorus frog	*Pseudacris streckeri*	X	X	X	X
Couch's spadefoot	*Scaphiopus couchii*	X			
Hurter's spadefoot	*Scaphiopus hurterii*	X	X	X	X
SALAMANDERS					
Ringed salamander	*Ambystoma annulatum*		X		
Spotted salamander	*Ambystoma maculatum*		X		X
Marbled salamander	*Ambystoma opacum*		X		X
Mole salamander	*Ambystoma talpoideum*		X		X
Small-mouthed salamander	*Ambystoma texanum*	X	X	X	X
Barred tiger salamander	*Ambystoma mavortium mavortium*	X	X	X	
Three-toed amphiuma	*Amphiuma tridactylum*				X
Ouachita dusky salamander	*Desmognathus brimleyorum*		X		
Dark-sided salamander	*Eurycea longicauda melanopleura*	X	X		
Cave salamander	*Eurycea lucifuga*		X		

TABLE 3-2 (CONT'D)

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
Many-ribbed salamander	*Eurycea multiplicata*	X	X		
Oklahoma salamander	*Eurycea tynerensis*		X		
Red River mudpuppy	*Necturus maculosus louisianensis*	X	X		
Kiamichi slimy salamander	*Plethodon kiamichi*		X		
Southern Red-backed salamander	*Plethodon serratus*		X		X
Western lesser siren	*Siren intermedia nettingi*	X	X		X
LIZARDS					
Texas spotted whiptail	*Aspidoscelis gularis gularis*	X			
Prairie racerunner	*Aspidoscelis sexlineata viridis*	X	X	X	X
Eastern collared lizard	*Crotaphytus collaris*	X	X	X	X
Prairie earless lizard	*Holbrookia maculate perspicua*	X		X	
Western slender glass lizard	*Ophisaurus attenuatus attenuatus*	X	X	X	X
Broad-headed skink	*Plestiodon laticeps*	X	X		X
Great Plains skink	*Plestiodon obsoletus*	X		X	
Prairie lizard	*Sceloporus consobrinus*	X		X	
Eastern fence lizard	*Sceloporus undulates*	X	X		X
Little brown skink	*Scincella lateralis*	X	X	X	X
SNAKES					
Osage copperhead	*Agkistrodon contortrix phaeogaster*	X	X	X	
Western cottonmouth	*Agkistrodon piscivorus leucostoma*	X	X		X
Arizona glossy snake	*Arizona elegans noctivaga*	X		X	
Western wormsnake	*Carphophis vermis*	X	X	X	X
Southern black racer	*Coluber constrictor priapus*	X	X		X
Western coachwhip	*Coluber flagellum testaceus*	X		X	
Western diamond-backed rattlesnake	*Crotalus atrox*	X	X		
Eastern hog-nosed snake	*Heterodon platirhinos*	X	X	X	X
Texas nightsnake	*Hypsiglena jani texana*	X			
Speckled kingsnake	*Lampropeltis getula holbrooki*	X	X	X	X
Red milksnake	*Lampropeltis triangulum syspila*	X	X		
Blotched watersnake	*Nerodia erythrogaster transversa*	X	X	X	
Diamond-backed watersnake	*Nerodia rhombifer*	X	X	X	X
Rough greensnake	*Opheodrys aestivus*	X	X	X	X
Great Plains ratsnake	*Pantherophis emoryi*	X	X	X	X
Texas ratsnake	*Pantherophis obsoletus*	X	X		X
Bullsnake	*Pituophis catenifer sayi*	X	X	X	
Western pigmy rattlesnake	*Sistrurus miliarius streckeri*	X	X		X
Flat-headed snake	*Tantilla gracilis*	X	X	X	X

TABLE 3-2 (CONT'D)

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
Red-sided gartersnake	*Thamnophis sirtalis parietalis*	X	X	X	X
Rough earthsnake	*Virginia striatula*	X	X	X	X
Smooth earthsnake	*Virginia valeriae*	X	X	X	X
TURTLES					
Western spiny softshell	*Apalone spinifera hartwegi*	X	X	X	
Pallid spiny softshell	*Apalone spinifera pallida*	X	X		X
Eastern snapping turtle	*Chelydra serpentina serpentina*	X	X	X	X
Ouachita map turtle	*Graptemys ouachitensis ouachitensis*	X	X	X	X
Yellow mud turtle	*Kinosternon flavescens*	X		X	
Mississippi mud turtle	*Kinosternon subrubrum hippocrepis*	X	X		X
Eastern musk turtle	*Sternothorus odoratus*	X	X		X
Three-toed box turtle	*Terrapene carolina triunguis*	X	X	X	X
Ornate box turtle	*Terrapene ornata ornata*	X	X	X	X
Red-eared slider	*Trachemys scripta elegans*	X	X	X	X

[1] According to Conant and Collins (1998) and Crother (2008).

TABLE 3-3
REPRESENTATIVE COMMON AVIAN SPECIES IN THE BIOTIC PROVINCES
WITHIN THE ICP PLANNING AREA[1]

Common Name[2]	Scientific Name[2]	Biotic Province[3]			
		Texan	Carolinian	Kansan	Austroriparian
Ross's goose	*Chen rossii*	M	M	M	M
Canada goose	*Branta canadensis*	M, WR	M, WR	M, WR	M, WR
Wood duck	*Aix sponsa*	YR	YR	YR	YR
Gadwall	*Anas strepera*	M, WR	M, WR	M, WR	M, WR
American wigeon	*Anas americana*	M, WR	M, WR	M, WR	M, WR
Mallard	*Anas platyrhynchos*	YR	M, WR	YR	M, WR
Blue-winged teal	*Anas discors*	M, SR	M, SR	M, SR	M, SR
Northern shoveler	*Anas clypeata*	M	M	M	M
Northern pintail	*Anas acuta*	M, WR	M, WR	M, WR	M, WR
Northern bobwhite	*Colinus virginianus*	YR	YR	YR	YR
Pied-billed grebe	*Podilymbus podiceps*	M, SR	YR	M, SR	YR
Anhinga	*Anhinga anhinga*	SR			SR
Great blue heron	*Ardea herodias*	YR	YR	YR	YR
Green heron	*Butorides virescens*	M, SR	M, SR	M, SR	M, SR
Turkey vulture	*Cathartes aura*	YR	YR	YR	YR
Mississippi kite	*Ictinia mississippiensis*	SR	SR	SR	SR
Northern harrier	*Circus cyaneus*	M, WR	M, WR	M, WR	M, WR
Sharp-shinned hawk	*Accipiter striatus*	M, WR	M, WR	M, WR	M, WR
Cooper's hawk	*Accipiter cooperii*	YR	YR	YR	YR
Red-shouldered hawk	*Buteo lineatus*	SR	YR	SR	YR
Swainson's hawk	*Buteo swainsoni*	M, SR	M, SR	M, SR	M
Red-tailed hawk	*Buteo jamaicensis*	YR	YR	YR	YR
Sandhill crane	*Grus canadensis*	M	M	M	M
Semipalmated plover	*Charadrius semipalmatus*	M	M	M	M
Killdeer	*Charadrius vociferus*	YR	YR	YR	YR
Greater yellowlegs	*Tringa melanoleuca*	M	M	M	M
Franklin's gull	*Leucophaeus pipixcan*	M	M	M	M
Forster's tern	*Sterna forsteri*	M	M	M	M
Mourning dove	*Zenaida macroura*	YR	YR	YR	YR
Greater roadrunner	*Geococcyx californianus*	YR	YR	YR	YR
Eastern screech-owl	*Megascops asio*	YR	YR	YR	YR
Barred owl	*Strix varia*	YR	YR	YR	YR
Chuck-will's-widow	*Caprimulgus carolinensis*	M, SR	M, SR	M, SR	M, SR
Chimney swift	*Chaetura pelagica*	M, SR	M, SR	M, SR	M, SR
Ruby-throated hummingbird	*Archilochus colubris*	M, SR	M, SR	M, SR	M, SR

TABLE 3-3 (CONT'D)

Common Name[2]	Scientific Name[2]	Biotic Province[3]			
		Texan	Carolinian	Kansan	Austroriparian
Belted kingfisher	*Ceryle alcyon*	YR	YR	YR	YR
Red-bellied woodpecker	*Melanerpes carolinus*	YR	YR	YR	YR
Yellow-bellied sapsucker	*Sphyrapicus varius*	M, WR	M, WR	M, WR	M, WR
Downy woodpecker	*Picoides pubescens*	YR	YR	YR	YR
Northern flicker	*Colaptes auratus*	YR	YR	YR	YR
American kestrel	*Falco sparverius*	YR	YR	YR	YR
Eastern wood-pewee	*Contopus virens*	M, SR	M, SR	M, SR	M, SR
Acadian flycatcher	*Empidonax virescens*	M, SR	M, SR		M, SR
Eastern phoebe	*Sayornis phoebe*	M, SR	M, SR	M, SR	YR
Great-crested flycatcher	*Myiarchus crinitus*	M, SR	M, SR	M, SR	M, SR
Western kingbird	*Tyrannus verticalis*	M, SR	M, SR	M, SR	
Eastern kingbird	*Tyrannus tyrannus*	M, SR	M, SR	M, SR	M, SR
Scissor-tailed flycatcher	*Tyrannus forficatus*	M, SR	M, SR	M, SR	M, SR
Loggerhead shrike	*Lanius ludovicianus*	YR	YR	YR	YR
White-eyed vireo	*Vireo griseus*	M, SR	M, SR		M, SR
Red-eyed vireo	*Vireo olivaceus*	M, SR	M, SR	M, SR	M, SR
Blue jay	*Cyanocitta cristata*	YR	YR	YR	YR
American crow	*Corvus brachyrhynchos*	YR	YR	YR	YR
Horned lark	*Eremophila alpestris*	YR	WR	YR	WR
Cliff swallow	*Petrochelidon pyrrhonota*	M, SR	M, SR	M, SR	M
Carolina chickadee	*Poecile carolinensis*	YR	YR	YR	YR
Tufted titmouse	*Baeolophus bicolor*	YR	YR	YR	YR
White-breasted nuthatch	*Sitta carolinensis*	YR	YR	YR	YR
House wren	*Troglodytes aedon*	M, SR	M, SR	M, SR	M
Carolina wren	*Thryothorus ludovicianus*	YR	YR	YR	YR
Ruby-crowned kinglet	*Regulus calendula*	M, WR	M, WR	M	M, WR
Eastern bluebird	*Sialia sialis*	YR	YR	YR	YR
Wood thrush	*Hulocichla mustelina*	M, SR	M, SR	M, SR	M, SR
American robin	*Turdus migratorius*	YR	YR	YR	YR
Brown thrasher	*Toxostoma rufum*	YR	YR	SR	YR
Northern mockingbird	*Mimus polyglottos*	YR	YR	YR	YR
Chestnut-collared longspur	*Calcarius ornatus*	M, WR	M	M, WR	
Hooded warbler	*Setophaga citrina*		SR		SR
Northern parula	*Setophaga americana*	M, SR	M, SR	M, SR	M, SR
Pine warbler	*Setophaga pinus*	SR	SR		YR
Yellow-rumped warbler	*Setophaga coronata*	M, WR	M, WR	M, WR	M, WR

TABLE 3-3 (CONT'D)

Common Name[2]	Scientific Name[2]	Biotic Province[3]			
		Texan	Carolinian	Kansan	Austroriparian
Spotted towhee	*Pipilo maculates*	M, WR	M, WR	M, WR	
Vesper sparrow	*Pooecetes gramineus*	M, WR	M, WR	M, WR	M, WR
Lark sparrow	*Chondestes grammacus*	M, SR	M, SR	M, SR	M, SR
Le Conte's sparrow	*Ammodramus lecontei*	M	M	M	M, WR
Dark-eyed junco	*Junco hyemalis*	M, WR	M, WR	M, WR	M, WR
Summer tanager	*Piranga rubra*	M, SR	M, SR	M, SR	M, SR
Northern cardinal	*Cardinalis cardinalis*	YR	YR	YR	YR
Blue grosbeak	*Passerina caerulea*	SR	SR	SR	SR
Indigo bunting	*Passerina cyanea*	M, SR	M, SR	M, SR	M, SR
Painted bunting	*Passerina ciris*	SR	SR	SR	SR
Red-winged blackbird	*Agelaius phoeniceus*	YR	YR	YR	YR
Eastern meadowlark	*Sturnella magna*	YR	YR	YR	YR
Western meadowlark	*Sturnella neglecta*	M, WR	M, WR	YR	M, WR
Brown-headed cowbird	*Molothrus ater*	YR	YR	YR	YR
Baltimore oriole	*Icterus galbula*	M, SR	M, SR	M, SR	M, SR

[1] According to Sibley (2000).

[2] Nomenclature follows American Ornithologists' Union (AOU, 1998,2000, 2002–2013).

[3] YR–Year-round Resident; SR–Summer Resident; WR–Winter Resident; M–Migrant.

TABLE 3-4
REPRESENTATIVE MAMMAL SPECIES IN THE BIOTIC PROVINCES WITHIN THE ICP PLANNING AREA[1]

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
Virginia opossum	*Didelphis virginiana*	X	X	X	X
Nine-banded armadillo	*Dasypus novemcinctus*	X	X		X
Eastern pipistrelle	*Pipistrellus subflavus*	X	X		X
Brazilian free-tailed bat	*Tadarida brasiliensis*	X	X	X	X
Swamp rabbit	*Sylvilagus aquaticus*	X	X		X
Eastern cottontail	*Sylvilagus floridanus*	X	X	X	X
Black-tailed jackrabbit	*Lepus californicus*	X	X	X	X
Eastern chipmunk	*Tamias striatus*	X	X		X
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	X	X	X	
Eastern gray squirrel	*Sciurus carolinensis*	X	X	X	X
Eastern fox squirrel	*Sciurus niger*	X	X	X	X
Plains pocket gopher	*Geomys bursarius*	X	X	X	
Fulvous harvest mouse	*Reithrodontomys fulvescens*	X	X	X	X
White-footed mouse	*Peromyscus leucopus*	X	X	X	X
Deer mouse	*Peromyscus maniculatus*	X	X	X	
Hispid cotton rat	*Sigmodon hispidus*	X	X	X	X
Eastern woodrat	*Neotoma floridana*	X	X	X	X
Woodland vole	*Microtus pinetorum*	X	X	X	X
Common muskrat	*Ondatra zibethicus*	X	X	X	X
Nutria	*Myocastor coypus*	X	X		X
Coyote	*Canis latrans*	X	X	X	X
Common gray fox	*Urocyon cinereoargenteus*	X	X	X	X
Northern raccoon	*Procyon lotor*	X	X	X	X
American badger	*Taxidea taxus*	X	X	X	X
Striped skunk	*Mephitis mephitis*	X	X	X	X
Bobcat	*Lynx rufus*	X	X	X	X
White-tailed deer	*Odocoileus virginianus*	X	X	X	X

[1] According to Caire et al. (1989), Wilson and Ruff (1999), and American Society of Mammalogists (2014).

TABLE 3-5
REPRESENTATIVE FISH SPECIES IN THE BIOTIC PROVINCES WITHIN THE ICP PLANNING AREA[1]

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
Southern brook lamprey	*Ichthyomyzon gagei*		X		X
Alligator gar	*Atractosteus spatula*	X			X
Longnose gar	*Lepisosteus osseus*	X	X	X	X
Shortnose gar	*Lepisosteus platostomus*	X	X	X	X
Bowfin	*Amia calva*	X			X
Goldeye	*Hiodon alosoides*	X	X		X
Gizzard shad	*Dorosoma cepedianum*	X	X	X	X
Threadfin shad	*Dorosoma petenense*	X	X	X	X
Common carp	*Cyprinus carpio*	X	X	X	X
Spotfin shiner	*Cyprinella spiloptera*		X		
Golden shiner	*Notemigonus crysoleucas*	X	X		X
Emerald shiner	*Notropis atherinoides*	X	X		
Red River shiner	*Notropis bairdi*	X			X
White sucker	*Catostomus commersonii*		X		
Blue catfish	*Ictalurus furcatus*	X	X	X	X
Channel catfish	*Ictalurus punctatus*	X	X	X	X
Tadpole madtom	*Noturus gyrinus*	X			
Flathead catfish	*Pylodictis olivaris*	X	X	X	X
Redfin pickerel	*Esox americanus*	X	X		X
Pirate perch	*Aphredoderus sayanus*				X
Brook silverside	*Labidesthes sicculus*	X		X	
Inland silverside	*Menidia beryllina*				X
Plains killifish	*Fundulus zebrinus*	X		X	
White bass	*Morone chrysops*	X	X	X	X
Striped bass	*Morone saxatilis*	X	X	X	X
Rock bass	*Ambloplites rupestris*		X		
Flier	*Centrarchus macropterus*	X			X
Green sunfish	*Lepomis cyanellus*	X	X	X	X
Warmouth	*Lepomis gulosus*	X	X		X
Bluegill	*Lepomis macrochirus*	X	X	X	X
Redspotted sunfish	*Lepomis miniatus*				X
Largemouth bass	*Micropterus salmoides*	X	X	X	X
White crappie	*Pomoxis annularis*	X	X	X	X
Mud darter	*Etheostoma asprigene*	X			X

TABLE 3-5 (CONT'D)

Common Name	Scientific Name	Biotic Province			
		Texan	Carolinian	Kansan	Austroriparian
Orangebelly darter	*Etheostoma radiosum*	X			X
Logperch	*Percina caprodes*	X	X	X	X
Walleye	*Stizostedion vitreum*	X	X	X	X
Freshwater drum	*Aplodinotus grunniens*	X	X	X	X
Blue tilapia	*Oreochromis aurea*	X	X		X

[1] According to Jester et al. (1992), Miller and Robinson (2004), and Oklahoma Department of Wildlife Conservation (2014).

3.9 THREATENED AND ENDANGERED SPECIES

The sections below discuss the one covered species occurring in the ICP Planning Area as well as other federally listed species, those species proposed for Federal listing, Federal candidate species, and one de-listed, but still protected species that also occur in the ICP Planning Area.

3.9.1 Covered Species

The only covered species included in the ICP is the ABB. The ABB was federally listed as endangered on July 13, 1989 (54 *Federal Register* [*FR*] 29652) without Critical Habitat. The ABB Recovery Plan was finalized in 1991 and a 5-year Review was completed in 2008 that recommended the ABB's status remain as endangered (USFWS 1991, 2008).

The ABB is a member of the beetle family Silphidae (subfamily Nicrophorinae), known commonly as burying or carrion beetles (Perkins 1980). The subfamily Nicrophorinae is known for beetles that bury vertebrate carcasses for reproductive purposes and for exhibiting parental care to their young (USFWS 1991). The ABB is the largest carrion beetle in North America, reaching 1.0 to 1.8 inches (2.5 to 4.6 centimeters) in length (Wilson 1971, Anderson 1982, Backlund and Marrone 1997). ABBs are black with orange-red markings. The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum (the upper surface of the first segment of the body that lies between the head and the abdomen), a feature shared with no other members of the genus *Nicrophorus* in North America (USFWS 1991). Male and female ABBs can be distinguished by their orange-red clypeal marking: males exhibit a larger, rectangular marking whereas females have a smaller, triangular marking (USFWS 1991, Bedick et al. 1999).

The ABB is a nocturnal species active in the summer months (active season) when ambient nighttime air temperatures consistently exceed 60 degrees Fahrenheit (15.5 degrees Celsius) (USFWS 1991). During the daytime, ABBs are believed to bury themselves in vegetation litter; they bury deeper into the soil for the duration of the winter. Reproduction involves competition for, acquisition, and burial of size-specific animal carrion and includes parental care of offspring, an unusual behavior in insects. Immature beetles (tenerals) emerge in late summer, overwinter as

adults, and comprise the breeding population the following summer (Kozol et al. 1988, USFWS 1991).

In Oklahoma, ABBs are typically active from mid-May to late-September, with reproductive activity typically being completed by mid-August, although individuals may breed as early as April or as late as August. Adult ABBs seek a mate soon after emergence following the inactive season. Cooperative burial by the mating pair is common, though individuals of either sex are capable of individually burying the carrion (Kozol et al. 1988). The female ABB lays eggs in the soil near the carcass, which is then used as a food source by larval ABBs until they emerge in approximately 48 to 65 days (Kozol et al. 1988). The reproductive process from carcass burial to eclosure takes approximately 48 to 79 days (Kozol et al. 1988, Kozol 1991, Bedick et al. 1999, Ratcliffe 1996).

Adults locate carcasses using chemoreceptors on their antennae. Burying beetles are capable of finding a carcass between 1 and 48 hours after the animal's death at a distance of up to 18.6 miles (30 kilometers) (Jurzenski et al. 2011). A strong flier, the ABB is characterized by high nocturnal mobility and has been observed to travel between habitat types and over substantial distances. Reported maximum overnight movement distances are from 0.1 to 18.6 miles (0.2 to 30 kilometers) in various parts of their range.

The ABB is considered to be a feeding habitat generalist and has been successfully live-trapped in several vegetation types including native grasslands, grazed pasture, riparian zones, coniferous forests, mature forest, and oak-hickory forest, as well as on a variety of various soil types (USFWS 1991, Creighton et al. 1993, Lomolino and Creighton 1996, Lomolino et al. 1995). ABB habitat in Oklahoma consists of fragmented grassland/woodland matrices. The species is found within a mixture of vegetation types from oak-hickory and coniferous forests on lowlands, slopes, and ridge tops to deciduous riparian corridors and valley pasturelands (USFWS 1991, Creighton et al. 1993).

The historical distribution of the ABB includes over 150 counties in 35 states (Peck and Kaulbars 1987, USFWS 1991). The current distribution of the species composes only 10 percent of its historic range (Creighton et al. 2007). Currently, the ABB is known to occur in nine states: Rhode Island, Massachusetts, Oklahoma, Arkansas (Carlton and Rothwein 1998), Nebraska (Ratcliffe 1996, Bedick et al. 1999), Kansas (Sikes and Raithel 2002), South Dakota (Backlund and Marrone 1995, 1997; Ratcliffe 1996), Texas (Godwin 2003), and Missouri (USFWS 2012). The ABBs in Missouri are part of a nonessential experimental population (under section 10(j) of the ESA) that was reintroduced in 2012.

For a more-detailed description of the ABB, its life history, habitat, range, reasons for decline, and threats, see Section 3.1 of the ICP.

3.9.2 Noncovered Species

Several other federally listed species (18), as well as two species proposed for Federal listing, two candidate species, and the de-listed bald eagle (*Haliaeetus leucocephalus*) also occur in the Planning Area and are discussed briefly in Table 3-6. While the bald eagle is no longer federally listed, it still receives protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

The 18 federally listed species consist of 1 plant, the endangered harperella (*Ptilimnium nodosum*); 5 mollusks, the endangered Ouachita Rock pocketbook (*Arkansia wheeleri*), scaleshell mussel (*Leptodea leptodon*), winged mapleleaf (*Quadrula fragosa*), and Neosho mucket (*Lampsilis rafinesqueana*) and the threatened rabbitsfoot (*Quadrula cylindrica* ssp*. cylindrica*); 4 threatened fish, the Ozark cavefish (*Amblyopsis nosae*), Arkansas river shiner Neosho madtom (*Noturus placidus*), and leopard darter (*Percina pantherina*); 1 reptile, the American alligator (*Alligator mississippiensis*), threatened due to similarity of appearance; 4 birds, the endangered whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), and red-cockaded woodpecker (*Picoides borealis*), and the threatened piping plover (*Charadrius melodus*); and 3 endangered mammals, the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), and Ozark big-eared bat (*Corynorhinus townsendii ingens*). One bird species, the red knot (*Calidris canutus rufa*), and one mammal species, the northern long-eared bat (*Myotis septentrionalis*) have recently been proposed to be federally listed as threatened and endangered, respectively (78 *FR* 69993 and 78 *FR* 61046, respectively).

Candidate species are those species for which enough information about their vulnerability and threat(s) is available to propose them for listing as endangered or threatened, but they have been precluded by higher priority listing activities. The three candidate species in Table 3-6 consist of one invertebrate, the rattlesnake-master borer moth (*Papaipema eryngii*); one fish, the Arkansas darter (*Etheostoma cragini*)*;* and one bird, Sprague's pipit (*Anthus spragueii*).

On July 9, 2007, the Service removed the bald eagle (*Haliaeetus leucocephalus*) from the list of threatened and endangered species under the ESA (72 *FR* 37345). However, the bald eagle still receives protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Additional information on these species can be found on the Oklahoma Ecological Services Field Office website[1] and on the Service's Information, Planning, and Conservation System (IPAC)[2].

[1] http://www.fws-gov/southwest/es/oklahoma/ABBICP

[2] http://ecos.fws.gov/ipac/

TABLE 3-6
NONCOVERED SPECIES WITHIN THE PLANNING AREA[1]

Common Name[2]	Scientific Name[2]	Status[3]	Critical Habitat[3]	Description/Habitat	Range[4]	Distribution in the Planning Area[4]
Plants						
Harperella	*Ptilimnium nodosum*	Endangered (53 *Federal Register* 37978, 28 September 1988)	No	An aromatic annual herbaceous plant, ranges from a few inches to about 2 feet in height, with week stems. It has hollow tubular leaves and flat clusters of small white flowers on top of the stems. Harperella was first discovered in neighboring Arkansas in 1990, and since has been found in 11 streams within the Foruche LaFave and Ouachita River drainages (Arkansas Natural Heritage Commission 2013).	Alabama, Arkansas, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia	McCurtain County in Oklahoma
Invertebrates						
Ouachita rock pocketbook	*Arkansia wheeleri*	Endangered (56 *Federal Register* 54950, 10 October 1991)	No	Occurs in medium-sized rivers, in backwater or slackwater areas adjacent to the main channel, and from muddy or silty substrates. This species has also been reported in pools in small, low-current rivers. It prefers sand and cobble-gravel substrates (Howells et al. 1996)	Arkansas and Oklahoma	Oklahoma counties : Atoka, Choctaw, Latimer, Le Flore, McCurtain, Pittsburg, and Pushmataha
Scaleshell mussel	*Leptodea leptodon*	Endangered (66 *Federal Register* 51322, 9 October 2001)	No	Occurs in medium to large rivers, in stable riffles and runs with gravel or mud substrate and moderate current velocity. The species requires good water quality, often where a diversity of other mussels are found and is now consistently found in only the Meramec, Bourbeuse, and Gasconade rivers in Missouri (USFWS 2010a).	Arkansas, Missouri, Nebraska, Oklahoma, and South Dakota	Oklahoma counties : Choctaw, Le Flore, McCurtain, and Pushmataha
Winged mapleleaf	*Quadrula fragosa*	Endangered (50 *Federal Register* 28345, 20 June 1991)	No	Occurs in clear, high quality water, and are found in riffles with clean gravel, sand, or rubble bottoms. Formerly, it may also have been found in large rivers and streams on mud, mud-covered gravel, and gravel bottoms. Only 5 extant populations currently remain. The remaining populations are found in the St. Croix River on the border between Minnesota and Wisconsin, the Saline and Ouachita rivers in Arkansas, the Little River in Oklahoma, and the Bourbeuse River in Missouri (USFWS 2009a).	Arkansas, Minnesota, Missouri, Oklahoma, and Wisconsin	Oklahoma counties: Choctaw, Le Flore, McCurtain, Ottawa, and Pushmataha
Neosho mucket	*Lampsilis rafinesqueana*	Endangered (78 *Federal Register* 57076, 17 September 2013)	Proposed (78 *Federal Register* 52894, 27 August 2013)	A freshwater mussel with a slightly rounded shell, is found in stable gravel and finer sediment in near-shore and backwater portions of small rivers (Oklahoma Department of Wildlife Conservation 2013a). Over 90% of the lands draining the watersheds populated by the mussel are privately owned (USFWS 2010b). Currently within Oklahoma, the species is found in the Illinois River upstream from Tenkiller Reservoir, and may occur in stable portions of the Barren Fork, Caney Creek, and Flint Creek, which are larger tributaries of the Illinois River (Oklahoma Department of Wildlife Conservation 2013a).	Arkansas, Kansas, Missouri, and Oklahoma	Oklahoma counties: Adair, Cherokee, Craig, Delaware, Mayes, Nowata, Osage, Ottawa, Rogers, and Wagoner
Rabbitsfoot	*Quadrula cylindrica* ssp. *cylindrica*	Threatened (78 *Federal Register* 57076, 17 September 2013)	Proposed (78 *Federal Register* 52894, 27 August 2013)	An elongated, rectangular freshwater mussel, with a green to dark brown shell and V-shaped zig-zag patterns. The shell surface is rough and has large knobs that run along its ridge. This species is found throughout the Mississippi, Ohio, Wabash, Cumberland, and Tennessee River drainages in 13 states. Typical habitat consists of sand and gravel of medium to large rivers or in gravel-bottomed small to medium, swift flowing streams. The decline in the rabbitsfoot can be attributed to significant habitat loss, range restriction, and population fragmentation and size reduction (USFWS 2009b). Today, the species remains extant nationwide in approximately 33% of the 136 rivers and streams in which it was documented historically (Roe 2002, Butler 2005).	Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee	Oklahoma counties: Adair, Cherokee, Delaware, McCurtain, and Rogers

TABLE 3-6 (Cont'd)

Common Name[2]	Scientific Name[2]	Status[3]	Critical Habitat[3]	Description/Habitat	Range[4]	Distribution in the Planning Area[4]
Rattlesnake – master borer moth	*Papaipema eryngii*	Candidate	No	The rattlesnake-master borer moth, a member of the Noctuidae family (owlet moths), measures 1.4–1.9 inches (3.6–4.8 centimeters) as an adult, and is closely identified with the rattlesnake master or button eryngo plant (*Eryngium yuccifolium*), a warm-season perennial native forb used exclusively for the moth's larval diet. Within Oklahoma, the host plant has been recorded in 20 eastern counties, 19 of which are in the Planning Area (USDA 2014); however, the rattlesnake-master borer moth is currently known from only three populations within The Nature Conservancy's Tallgrass Nature Preserve in Osage County (USFWS 2013b).	Arkansas, Illinois, Kansas, North Carolina, and Oklahoma	Oklahoma counties: Osage (host plant occurs in 18 additional counties)
Fish						
Ozark cavefish	*Amblyopsis nosae*	Threatened (49 *Federal Register* 43965, 1 November 1984)	No	A true troglobitic cavefish with a body nearly devoid of pigment, has apparently disappeared from over 40% of its historic locations. There are reports of it occurring in 52 caves; however, only 23 have been confirmed. It is currently known from only 13 caves in 6 counties of the Springfield Plateau of southwest Missouri, northwest Arkansas, and northeast Oklahoma (USFWS 1984).	Arkansas, Missouri, and Oklahoma	Oklahoma counties: Delaware, Mayes, and Ottawa
Arkansas River shiner	*Notropis girardi*	Threatened (63 *Federal Register* 64771, 23 November 1998)	Yes (70 *Federal Register* 59808, 13 October 2005)	A small straw-colored fish that historically occurred throughout the Arkansas River main stem and in that river's major right bank tributary basins. The fish is extremely dependent upon flood flows from June through August for successful spawning, and declining streamflows have now restricted its former range to a few stream reaches within the Lower Arkansas, Salt Fork Arkansas, and possibly the Cimarron basins (Kansas Department of Wildlife, Parks and Tourism 2013a).	Arkansas, Kansas, New Mexico, Oklahoma, and Texas	Oklahoma counties: Cleveland, Garvin, Hughes, McClain, McIntosh, Noble, Payne, Pittsburg, Pontotoc, Pottawatomie, and Seminole
Neosho madtom	*Noturus placidus*	Threatened (55 *Federal Register* 21148, 22 May 1990)	No	A small deep-bodied fish, is almost exclusively found in riffles (Cross and Collins 1975, Deacon 1961), with adults utilizing moderate to swift currents, and juveniles most often found in areas of low current. Impoundments, dredging activities, and increased water demands have isolated the madtom to 3 known populations in the Neosho, Cottonwood, and Spring rivers in southeast Kansas, southwestern Missouri, and northeastern Oklahoma (USFWS 1990a).	Kansas, Missouri, and Oklahoma	Oklahoma counties : Craig and Ottawa
Leopard darter	*Percina pantherina*	Threatened (43 *Federal Register* 3711−3716, 27 January 1978)	Yes (43 *Federal Register* 3711−3716, 27 January 1978)	A rare small tan to olive percid fish, is endemic to the Little River Basin of southeast Oklahoma and southwest Arkansas. They typically inhabit pools containing predominantly rubble and boulder substrates with current velocities less than 48 centimeters/second (Jones 1984, Lechner et al. 1987). Because the leopard darter usually only spawns once in their lifetime, the remaining populations are susceptible to climatological changes, in particular precipitation (USFWS 2013c).	Arkansas and Oklahoma	Oklahoma counties: Choctaw, Le Flore, McCurtain, and Pushmataha
Arkansas darter	*Etheostoma cragini*	Candidate, Listing Priority: 11, Magnitude: Moderate to Low, Immediacy: Non-imminent	No	A small, stout-bodied member of the perch family. They prefer shallow, clear, spring-fed tributary and headwater streams having sand or sandy-gravel substrates. The Arkansas darter's range has included sites in extreme northwestern Arkansas, southwestern Missouri, and northeastern Oklahoma, within the Neosho River watershed. Additional populations occur in the Cimarron watershed in northwest Oklahoma (USFWS 2013d). Currently, the only viable populations currently known are in suitable streams south of the Arkansas River in south central Kansas and in Spring River drainage in Cherokee County (Kansas Department of Wildlife, Parks and Tourism 2013b).	Arkansas, Colorado, Kansas, Missouri, and Oklahoma	Oklahoma counties: Cherokee, Craig, Delaware, Mayes, Ottawa, and Rogers

TABLE 3-6 (Cont'd)

Common Name[2]	Scientific Name[2]	Status[3]	Critical Habitat[3]	Description/Habitat	Range[4]	Distribution in the Planning Area[4]
Reptiles						
American alligator	*Alligator mississippiensis*	Threatened by similarity of appearance	No	A member of the Crocodilia, a group of large reptiles that has remained relatively unchanged since it evolved around 180–200 million years ago (Murphy 1982). They reside in fresh and brackish water habitats but will venture into salt water, and are presently classified as "threatened due to similarity of appearance" to endangered crocodiles.	Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, and Texas	McCurtain County in Oklahoma
Birds						
Whooping crane	*Grus americana*	Endangered (32 *Federal Register* 4001, 11 March 1967)	Yes (43 *Federal Register* 20938–20942, 15 May 1978)	A large wading bird that, in the last 50 years, has returned from the brink of extinction. Only 4 wild populations of whooping crane exist, the largest of which is the Aransas/Wood Buffalo population, which breeds in Wood Buffalo National Park in northern Canada and migrates annually to Aransas National Wildlife Refuge and adjacent areas of the central Texas Coast in Aransas, Calhoun, and Refugio counties, where it winters (USFWS 1995, Lewis 1995). There are 3 other smaller, wild populations that include nonmigrating Florida and Louisiana populations, and another that migrates between Wisconsin and Florida. These are not self-sustaining and each is designated "experimental" rather than endangered. During migration, whooping cranes stop over at wetlands, fallow cropland, and pastures to roost and feed. Based on migration data, the western portion of the Planning Area in Oklahoma is located inside of the Service-designated 95% sighting migration corridor for the whooping crane.	Canada and the States of Colorado, Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas	Oklahoma counties: Atoka, Bryan, Carter, Cleveland, Coal, Garvin, Hughes, Johnston, Kay, Lincoln, Love, Marshall, McClain, McIntosh, Murray, Muskogee, Noble, Okfuskee, Okmulgee, Osage, Pawnee, Payne, Pontotoc, Pottawatomie, Rogers, Seminole, Wagoner, and Washington
Least Tern (interior subspecies)	*Sterna antillarum*	Endangered (50 *Federal Register* 21784, 28 May 1985)	No	While the American Ornithologists' Union (1998) recognizes 3 subspecies of the least tern in the U.S., because of taxonomic uncertainties and the fact that, in Texas, the interior and coastal least terns are sympatric and not easily distinguished, the Service listed the interior population of the least tern as *Sterna antillarum*, defining it, in Texas, as least terns occurring more than 50 miles (80 kilometers) inland. All Oklahoma nesting least terns are classified as interior populations. The interior populations nest on salt flats; sand and gravel bars within wide, unobstructed river channels; the shorelines of rivers; sandbars or islands as well as shorelines of reservoirs and lakes; sand or gravel pits; dike fields; ash disposal areas of power plants; and active mine sites (USFWS 1990b).The interior least tern is migratory and occurs as remnant colonies within its historic range. It has been recorded from numerous counties within the Planning Area, along Arkansas, Cimarron, and Canadian river sandbars.	Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Tennessee, and Texas	All 45 counties of the Planning Area
Red-cockaded woodpecker	*Picoides borealis*	Endangered (35 *Federal Register* 16047, 13 October 1970)	No	Roosts in cavities of live, mature pine trees in open pine forests throughout the pine-belt region of the southern U.S. Large old pines are required as cavity trees, and they must occur in open stands with little or no hardwood midstory and few or no overstory hardwoods. Red-cockaded woodpeckers also require abundant foraging habitat consisting of mature pines with an open canopy, low densities of small pines, little or no hardwood or pine midstory, few or no overstory hardwoods, and abundant native bunchgrass and forb groundcovers. The abandonment of cavity clusters is often attributed to hardwood encroachment resulting from fire suppression (USFWS 2003).	Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Texas, and Virginia	Oklahoma counties : McCurtain and Pushmataha

TABLE 3-6 (Cont'd)

Common Name[2]	Scientific Name[2]	Status[3]	Critical Habitat[3]	Description/Habitat	Range[4]	Distribution in the Planning Area[4]
Piping plover	*Charadrius melodus*	Threatened, except Great Lakes Watershed where endangered (50 *Federal Register* 50726, 11 December 1985)	Yes, for Texas (74 *Federal Register* 23475, 19 May 2009)	A small shorebird that inhabits coastal beaches and tidal flats (Haig and Elliott-Smith 2004). The population that migrates through Planning Area breeds on the northern Great Plains and around the Great Lakes, and winters along the Texas Gulf Coast, where they spend 60 to 70% of the year (Campbell 2003). Piping plover's winter on coastal beaches and sandflats from the Carolinas to the Yucatan and through the Bahamas to the West Indies. Although there are only 2 nesting records from the Oklahoma Panhandle, the species is normally a migrant, with spring migration occurring in April and early May, and fall migration occurring between the last week of July and late September (Oklahoma Department of Wildlife Conservation 2013b).	The threatened portion of this species is known to or believed to occur in Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, and Virginia. The endangered Great Lakes watershed portion occurs in the States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin and Canada (Ontario)	All 45 counties of the Planning Area
Red knot	*Calidris canutus rufa*	Proposed for Listing Threatened (78 *Federal Register* 69993, 30 September 2013)	No	The red knot is a medium-sized, stocky, short-necked sandpiper with a rather short straight bill. The *rufa* subspecies, one of three subspecies occurring in North America, has one of the longest distance migrations known, travelling between its breeding grounds in the central Canadian Arctic to wintering areas that are primarily in South America (USFWS, 2011). The red knot is known as a "jump" migrant and may fly thousands of miles without stopping (USFWS, 2007). During migration, red knots may be found feeding in small groups, on sandy, shell-lined beaches, and to a lesser degree, on flats of bays and lagoons (Oberholser, 1974). Although intensive studies have been performed, the reasons for the population decline and reduced adult survival are imperfectly known; however, the reduced availability of horseshoe crab eggs has been identified as one of the main threats (USFWS, 2007).	The species is known to or believed to occur in 39 states within the U.S.	This species may potentially occur in all 45 counties of the Planning Area during migration
Sprague's pipit	*Anthus spragueii*	Candidate (75 *Federal Register* 56028, 15 September 2010) Listing Priority: 8, Magnitude: Moderate to Low, Immediacy: Imminent	No	A relatively small passerine endemic to the North American grasslands. It has a plain buff colored face with a large eye-ring. The Sprague's pipit is a ground nester that breeds and winters on open grasslands. It is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota as well as south-central Canada (USFWS 2013e). During migration and winter, Sprague's pipits may be found hunting insects and seeds in weedy fields and the vicinity of airports as well as in a wide variety of grasslands (Oberholser 1974). Loss of habitat is a leading cause for the decline of this species, and overgrazing by cattle and the invasion of exotic grasses has further reduced the quality of their breeding habitat (Robbins and Dale 1999).	Arizona, Colorado, Kansas, Louisiana, Minnesota, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, and Texas	This species may potentially occur in all 45 counties of the Planning Area during migration and/or winter
Bald eagle	*Haliaeetus leucocephalus*	Federally delisted (72 *Federal Register* 37345, 9 July 2007), but still provided protection under the Bald and Golden Eagle Protection Act (16 USC 668-668c) and the Migratory Bird Treaty Act	No	Likely the most recognizable of all raptors with their white head and tail feathers; yellow, sharply decurved beak; and dark brown plumage of the wings and body. Because fish and waterfowl comprise the bulk of the bald eagle's diet, the bald eagle primarily inhabits secluded, wooded areas near the coast or adjacent to rivers, lakes or reservoirs where wetlands, waters and forest meet. Although environmental contaminants have been responsible for the greatest decline in eagle populations, most populations of bald eagles appear to be producing young at a normal rate today (USFWS 1989).	Throughout North America	This species may potentially occur in all 45 counties of the Planning Area, occurring year round in the eastern portion and during migration and/or winter in the western portion

TABLE 3-6 (Cont'd)

Common Name[2]	Scientific Name[2]	Status[3]	Critical Habitat[3]	Description/Habitat	Range[4]	Distribution in the Planning Area[4]
Mammals						
Gray bat	*Myotis grisescens*	Endangered (41 *Federal Register* 17736, 28 April 1976)	No	One of the largest species in the genus Myotis in eastern North America (Decher and Choate 1995), and is one of the few species of bats in North America that inhabit caves year-round. The species primary range is concentrated in the cave regions of Alabama, Arkansas, Kentucky, Missouri and Tennessee. Within the Planning Area, the species is a migratory species, which lives in colonies within limestone caves in the Ozark region from April to September. Only 9 colonies are known to occupy caves in forested habitats in Ottawa, Delaware, Cherokee, and Adair counties, which migrate east and hibernate within caves in Arkansas and Kentucky (Oklahoma Department of Wildlife Conservation 2013c).	Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, North Carolina, Oklahoma, Tennessee, Virginia, and West Virginia	Oklahoma counties: Adair, Cherokee, Craig, Delaware, Mayes, Muskogee, Ottawa, Sequoyah, and Wagoner
Indiana bat	*Myotis sodalis*	Endangered (32 *Federal Register* 4001, 11 March 1967)	Yes (41 *Federal Register* 41914, 24 September 1976), but not in Planning Area	A small, temperate, insectivorous species that resides solitary or in small groups in forested habitats in the summer, and migrates to hibernate in colonies in caves and mines in the winter. Approximately 80% of the entire population hibernates in only 6 caves in Indiana and Kentucky. The Planning Area lies on the western edge of the species ranges and it has only been detected a few times in Oklahoma, primarily during the fall and winter in forested parts of the Ozark and Ouachita Mountains near the border with Arkansas (Oklahoma Department of Wildlife Conservation 2013d).	Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia	Oklahoma counties: Adair, Delaware, Le Flore, Pushmataha, and Sequoyah
Ozark big-eared bat	*Corynorhinus townsendii ingens*	Endangered (44 *Federal Register* 69206, 30 November 1979)	Yes (42 *Federal Register* 61290–61292, 2 December 1977)	A medium-sized bat that inhabits the limestone caves in the forested portions of the Ozark Highlands. They are not migratory, although they may move to different caves between seasons. Half of the estimated current population of less than 4,000 is believed to occur in Oklahoma, making it one of the states rarest mammals (Oklahoma Department of Wildlife Conservation 2013e).	Arkansas, Missouri, and Oklahoma	Oklahoma counties: Adair, Cherokee, Delaware, and Sequoyah
Northern long-eared bat	*Myotis septentrionalis*	Proposed for Listing Endangered (78 *Federal Register* 61046, 2 October 2013)	No	The northern long-eared bat, a medium-sized bat known for its long ears compared to other bats of the genus *Myotis*, is found across much of the eastern and north-central United States and all of Canada. In the summer, the northern long-eared bats roost singly or in colonies underneath bark, and in crevices or cavities of live or dead trees; however, in winter the bats spend their time hibernating in caves and mines, called hibernacula. White-nose syndrome, a fungal disease which affects bats, is the main threat to this species and population numbers in the Northwest have experienced declines by up to 99 percent at many hibernation sites (USFWS 2014). The Planning Area in Oklahoma is the southwestern edge of this species' range.	This species is known to or believed to occur in 39 states within the U.S.	This species may potentially occur in all 45 counties of the Planning Area

[1] According to the USFWS (2013a)

[2] Nomenclature follows the USFWS (2013a)

[3] Status obtained from the USFWS (2013a).

[4] Range and distribution within the Planning Area obtained from the USFWS (2013a)

3.10 LAND USE

3.10.1 State Planning Regions

Oklahoma is divided into 11 State Planning Regions, which are voluntary associations of local governments that address the problems and planning needs that cross the boundaries of individual local governments or that require regional attention. The Planning Area within Oklahoma occurs in all or portions of 9 of the state's 11 planning regions (Oklahoma Association of Regional Councils 2013). Table 3-7 lists the counties and major urban areas, airports, and parks/recreational areas within each of the nine State Planning Regions contained in the Planning Area. Figure 3-1 shows Federal lands occurring within the ICP Planning Area.

In addition to the several Federal and State recreational areas listed under each planning region in Table 3-7, multiple conservation easements and properties owned by The Nature Conservancy are located within the Planning Area. Also, many city and county parks and recreational areas are located within the Planning Area.

Two Natural Resources Conservation Service reports (2000, 2013) were used to describe the current land uses for the different regions of the Planning Area. These four primary land uses—cropland, rangeland, pastureland, and forest land—were aggregated and averaged by state planning region. In cases where a state planning region contained some counties that were not within the Planning Area, only those counties in the Planning Area were used in the calculation of land use averages. As shown in Table 3-7, the planning regions of the Planning Area on average consist of approximately 15 percent cropland, 28 percent rangeland, 20 percent forest cover, and 26 percent pastureland (Figure 3-2). Minor land uses, such as water or urban land uses, were excluded for clarity.

3.10.2 Transportation

Surface transportation in the Planning Area is provided by a network of primary, secondary, and local roads. Major U.S. interstates running through the Planning Area include Interstate Highway 35 (I-35), I-40, I-44, and I-244. These larger facilities are supplemented by numerous U.S. Highways, State Highways, rural county roads, and a network of residential streets in urban and suburban areas that complete the transportation grid (see Figure 3-1).

The Oklahoma Department of Transportation is currently conducting studies on four National High Priority Corridors, which are U.S. Congress-identified corridors of national significance. Two of these corridors, I-35 from Texas to Kansas, and U.S. Highway 412 from Tulsa, Oklahoma, to Memphis, Tennessee, are located partially within the Planning Area. Within the Planning Area, I-35 runs through Love, Carter, Murray, Garvin, McClain, Cleveland, Payne, Noble, and Kay counties, respectively, from south to north; U.S. Highway 412 runs through Noble, Payne, Pawnee, Tulsa,

TABLE 3-7
MAJOR LAND USES BY STATE PLANNING REGION

Regions	Counties in Planning Area	% CR	% RG	% PL	% FL	Major Urban Areas	Major Airports	Major Parks
Association of Central Oklahoma Governments	Cleveland	8.1	22.1	22.8	18.9	Norman	McCaslin, University of Oklahoma Westheimer	Lake Thunderbird SP
Association of South Central Oklahoma Governments	McClain	24.2	35.1	33.4	1.2	Purcell	David Jay Perry, Purcell Municipal	–
Indian Nations Council of Governments	Osage, Tulsa, Creek, Rogers, Wagoner	11.4	28.3	21.5	21.4	Tulsa	Bartlesville Municipal, Jones Memorial, Claremore Regional, Sam Riggs, Hominy Municipal, Buzzard's Roost, Dobie's, Gundy's, Pawhuska Municipal, Ponca City Regional, William R. Pogue Municipal, Skiatook Municipal, Stroud Municipal, Tulsa International, Richard Lloyd Jones Jr., Harvey Young, Hefner-Easley	Walnut Creek SP, Osage Hills SP, Keystone SP, Sequoyah Bay SP, Tallgrass Prairie Preserve
Central Oklahoma Economic Development District	Hughes, Okfuskee, Pottawatomie, Seminole, Payne, Lincoln	10.0	42.0	21.4	21.1	Shawnee, Stillwater, Chandler, Stroud	Cleveland Municipal, Holdenville Municipal, Okemah Flying Field, Pawnee Municipal, Seminole Municipal, Shawnee Regional, Westport, Stillwater Regional, Stroud Municipal, Chandler Regional	Lake McMurty

TABLE 3-7 (Cont'd)

Regions	Counties in Planning Area	% CR	% RG	% PL	% FL	Major Urban Areas	Major Airports	Major Parks
Southern Oklahoma Development Association	Atoka, Bryan, Carter, Coal, Johnston, Garvin, Love, Marshall, Murray, Pontotoc	7.2	41.6	28.1	16.2	Durant	Ada Municipal, Ardmore Municipal, Atoka Municipal, Falconhead, Colgate, Crazy Horse Municipal, Durant Regional, Healdton Municipal, Lindsay Municipal, Madill Municipal, Pauls Valley Municipal, Sulphur Municipal, Tishimingo	Tishomingo NWR, Lake Murray SP & Lodge, Lake Texoma SP, McGee Creek SP, Pontotoc Ridge Preserve
Grand Gateway Economic Development Association	Craig, Delaware, Mayes, Nowata, Ottawa, Rogers, Washington	11.5	25.3	33.1	17.5	Vinita, Miami	Grand Lake Regional, Bartlesville Municipal, Claremore Regional, Sam Riggs, Grove Municipal, Buzzards Roost, South Grand Lake Regional, Miami Municipal, Nowata Municipal, Gundy's, Mid-America Industrial, Vinita Municipal	Ozark Plateau NWR, Snowdale Area at Grand Lake SP, Natural Falls SP, Spavinaw Area at Grand Lake SP, Cherokee Area at Grand Lake SP, Twin Bridges Area at Grand Lake SP, Bernice Area at Grand Lake SP, Disney/Little Blue Area at Grand Lake SP, Honey Creek Area at Grand Lake SP
Eastern Oklahoma Development District	Adair, Cherokee, McIntosh, Muskogee, Okmulgee, Sequoyah, Wagoner	8.0	12.2	37.9	32.3	Muskogee	Tenkiller Lake, Eufaula Municipal, Fountainhead Lodge, Haskell Municipal, Henryetta Municipal, Davis Field, Okmulgee Regional, Sallisaw Municipal, Tahlequah Municipal, Hefner-Easley	Deep Fork NWR, Sequoyah NWR, Okmulgee SP, Lake Eufaula SP, Greenleaf SP, Tenkiller SP, Sequoyah Bay SP, Cherokee Landing SP, The Lodge at Sequoyah SP, J.T. Nickel Family Nature and Wildlife Preserve
Kiamichi Economic Development District of Oklahoma	Choctaw, Haskell, Latimer, Le Flore, McCurtain, Pittsburg, Pushmataha	3.0	4.9	29.1	53.1	Wilburton	Antlers Municipal, Broken Bow, Arrowhead, Stan Stamper Municipal, McCurtain County	Little River NWR, Sequoyah NWR, Ouchita National Forest, Arrowhead SP, Hugo Lake SP, Raymond Gary SP,

TABLE 3-7 (Cont'd)

Regions	Counties in Planning Area	% CR	% RG	% PL	% FL	Major Urban Areas	Major Airports	Major Parks
							Regional, McAlester Regional, Robert S Kerr, Stigler Regional, Talihina Municipal, West Woodward	Beavers Bend & Hochatown SP, Robbers Cave SP, Clayton Lake SP, Talimena SP, Lake Wister SP
Northern Oklahoma Development Authority	Kay, Noble	49.6	38.1	3.1	2.1	Perry, Ponca	Earl Henry, Ponca City Regional, Perry Municipal	Lake McMurty, Lake Ponca
	Averages	14.7	27.7	25.6	20.4			

Sources: USFWS (2013f), Oklahoma Association of Regional Councils (2013), U.S. Forest Service (2013), The Nature Conservancy (2013), Oklahoma Tourism & Recreation Department (2013), AirNav (2013), and Natural Resources Conservation Service (2000, 2013).

CR = cropland; RG - rangeland; PL - pastureland; FL = forestland = SP = state park= NWR = National Wildlife Refuge.

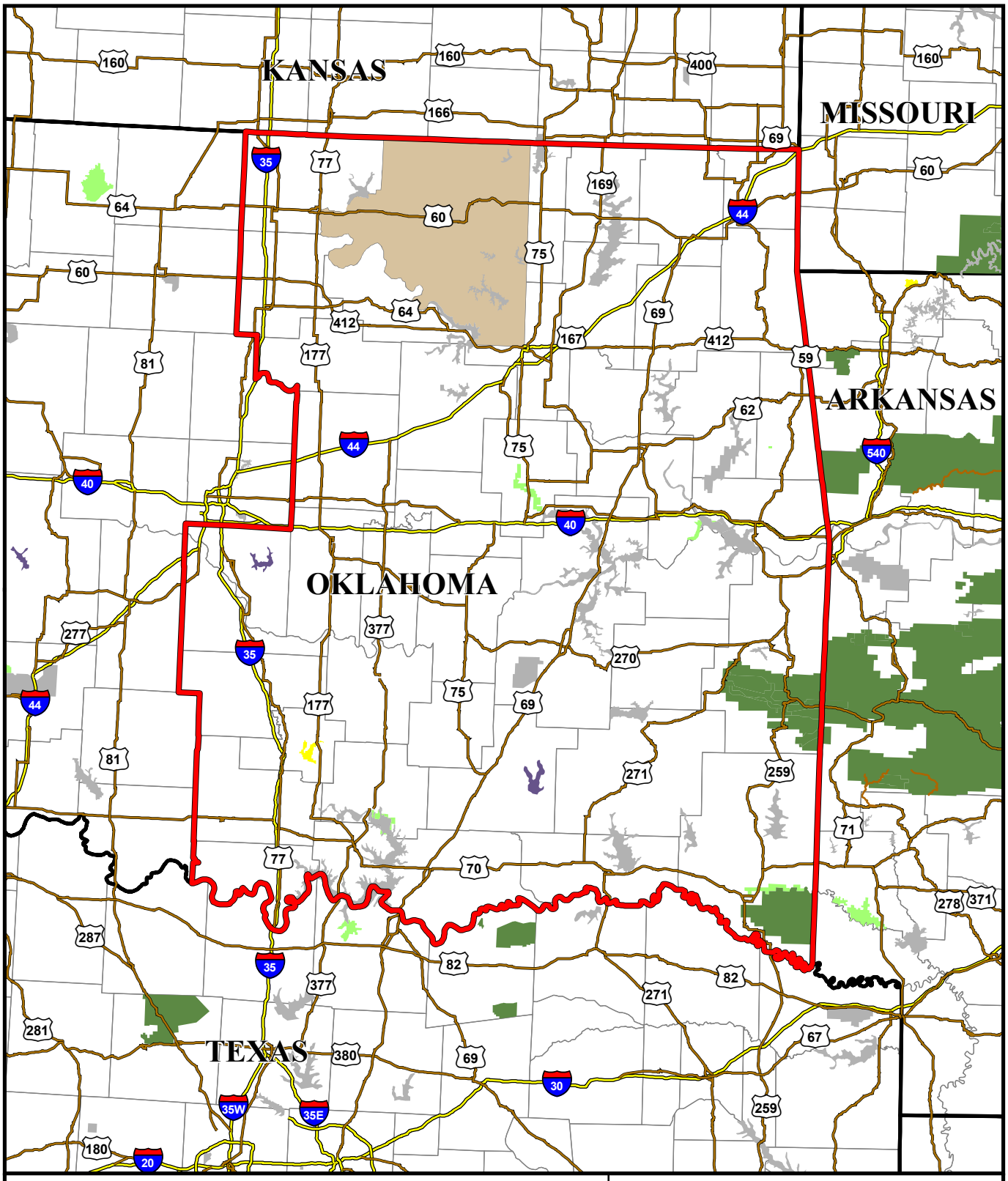

Figure 3-1

The ICP Planning Area in Relation to the Federal Lands and Major Roads of Oklahoma

Source: National Atlas of the United States (2005)

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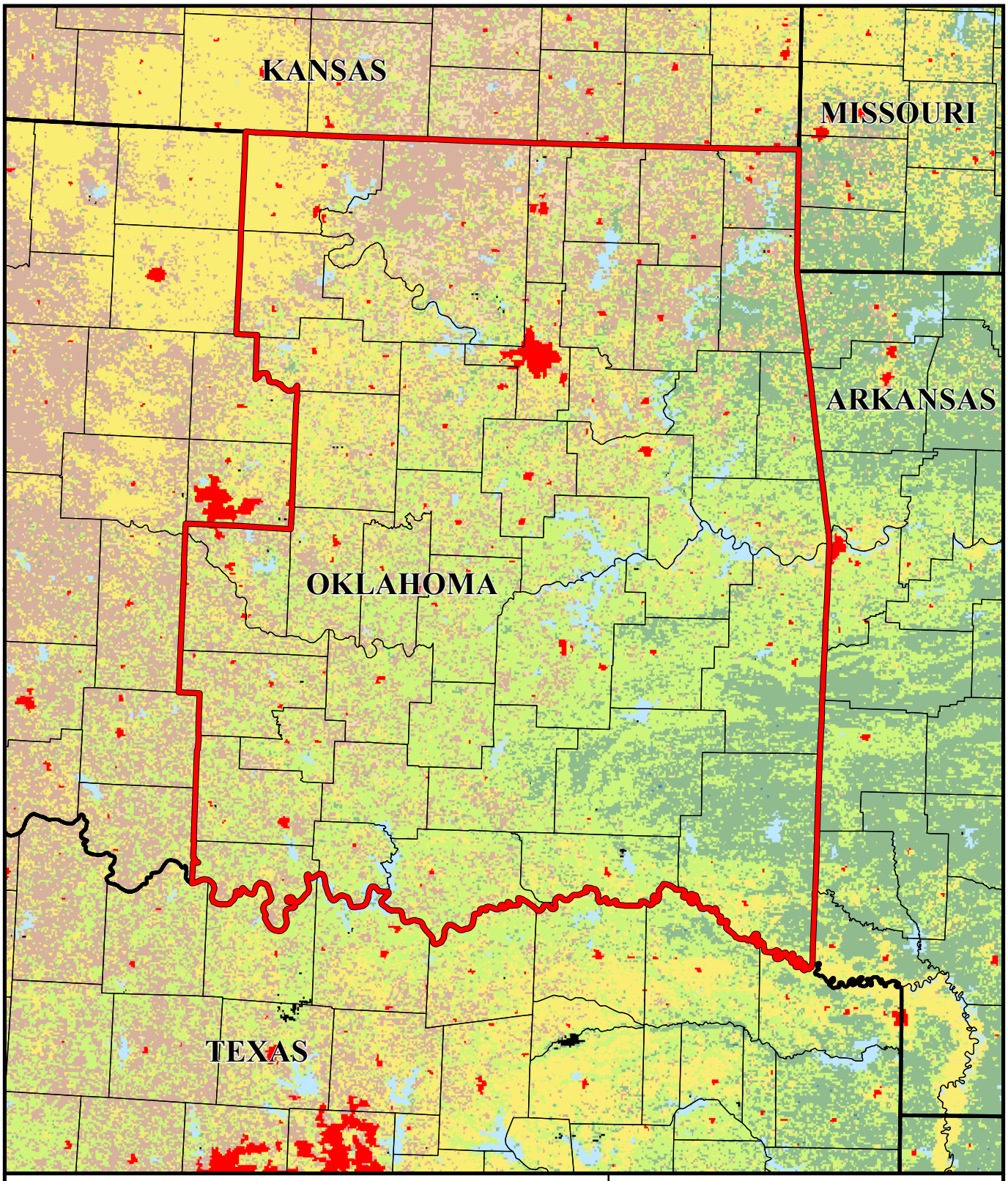

ICP Planning Area Boundary

Land Cover

- Open Water
- Mixed Forest
- Cropland
- Urban and Built-Up
- Shrubland
- Savannah
- Grassland

0 20 40

Miles

Figure 3-2

The ICP Planning Area in Relation to the USGS Land Cover of Oklahoma

Source: National Aeronautics and Space Administration (2002)

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Rogers, Mayes, and Delaware counties, respectively, from west to east. Additionally, the Oklahoma Department of Transportation is proposing improvements to various roads throughout the Planning Area, including resurfacing, rebuilding, repairing, upgrading, landscaping, and bridge replacement and repair (Oklahoma Department of Transportation 2013a). Other major Federal highways in the Planning Area include I-44, which traverses the northern portion of the Planning Area in a southwest-northeast direction, and I-40, which bisects the Planning area from west to east (see Figure 3-1).

Oklahoma contains four Metropolitan Planning Organizations designed to provide comprehensive transportation planning in their respective regions. The Planning Area contains the following three Metropolitan Planning Organizations: Association of Central Oklahoma Governments, Indian Nations Council of Governments, and the Frontier Metropolitan Planning Organization. The Association of Central Oklahoma Governments and Indian Nations Council of Governments Metropolitan Planning Organizations are the same organizations as listed in Table 3-7; the Frontier Metropolitan Planning Organization is based in Fort Smith, Arkansas, with portions of the Metropolitan Planning Organization extending into extreme eastern Oklahoma (Oklahoma Department of Transportation 2013b).

An extensive rail network is also located throughout the Planning Area, providing passenger and freight service under the operation of multiple rail companies (Federal Railroad Administration 2013).

3.11 AESTHETICS AND NOISE

3.11.1 Aesthetics

The term aesthetics refers to the subjective perception of natural beauty in the landscape and attempts to define and measure an area's scenic qualities. Potential aesthetic impacts are an issue of increasing concern to both the public and governmental bodies dealing with siting and approving new oil and gas facilities. Consideration of the visual environment includes a determination of aesthetic values where the location of a well pad or pipeline could potentially affect the scenic enjoyment of an area.

The aesthetic analysis deals primarily with potential visual impacts to the public, specifically the potential impacts on viewsheds or scenic areas visible from roads, highways, or publicly owned or accessible lands (e.g., parks or privately owned recreation areas open to the public). Several factors are taken into consideration when attempting to define the sensitivity, or potential impact, to a scenic resource from the oil and gas projects. Aesthetic values considered in this analysis, which combine to give an area its aesthetic identity, include the following:

- Uniqueness of the landscape in relation to the region as a whole
- Whether the scenic area is a foreground, middleground, or background view

- Focus of the view
- Scale of elements in the scene
- Number of potential viewers
- Duration of the view
- Amount of previous modification or disturbance to the landscape

Based on these criteria, the Planning Area as a whole exhibits a moderate degree of aesthetic quality because it encompasses a variety of regions and landscapes in Oklahoma. The topography of the Planning Area is varied, ranging from agricultural fields and plains to densely forested hills and low mountains. Landscapes with water as a major element (rivers, lakes, etc.) are usually considered to represent higher aesthetic values. The Planning Area contains many rivers and lakes, especially in the easternmost counties, some of which contain areas of well-developed riparian vegetation. Conversely, other water features within the Planning Area, especially in the western portions, can be dry or intermittent and areas of riparian vegetation are poorly developed around these features. In addition, the level of human impact within portions of the Planning Area is high due to the extensive ranching, agricultural operations, oil and gas operations, and the development of multiple cities and communities.

The historic Route 66, running from Chicago to Los Angeles, runs across the majority of Oklahoma, from the northeast corner to its western border with Texas. The nation's longest drivable stretch of Route 66, over 400 miles (644 kilometers), passes by charming towns, roadside diners, and quirky attractions that date back to the creation of this national route (Oklahoma Department of Transportation 2013c).

In addition to the historic Route 66, Oklahoma plays host to a number of Federal and State scenic byways. The National Scenic Byways Program is administered by the Federal Highways Administration. The Cherokee Hills Byway, situated in the foothills of the Ozark Mountains, is an 84-mile (135-kilometer) federally designated roadway with both lush scenery and a rich cultural background. Cherokee heritage can be found in architecture and museums along the roadway, which in portions correlates with the original Trail of Tears. Much of the highway runs parallel to the Illinois River in eastern Oklahoma as well, which adds to the natural beauty of the byway (America's Byways 2013).

The Talimena Scenic Drive is a 54-mile (87-kilometer) federally designated roadway in the Ouachita National Forest, located in portions of both Arkansas and Oklahoma. It meanders over the Winding Stair and Rich Mountains between Mena, Arkansas, and Talihina, Oklahoma, through natural settings with many vistas and panoramic opportunities. Wildlife, including black bears and roadrunners, are common sights along this roadway, along with ample stretches of forest (America's Byways 2013).

The Wichita Mountains Byway is a 93-mile (150-kilometer) federally designated highway through the 550-million-year-old Wichita Mountains, which host the largest remaining section of southern

mixed grassland and cross-timbers in North America. The adjacent Wichita Mountains Wildlife Refuge maintains herds of bison and elk, as well as turkeys (America's Byways 2013).

The Mountain Gateway Scenic Byway is a 22-mile (35-kilometer) state-designated roadway between Heavener, Oklahoma, and the Arkansas-Oklahoma state line. It runs through forested valleys of the Ouachita Mountains, cuts through the 26,445-acre (10,702-hectare) Winding Stair Mountain National Recreation Area, and offers views of the Black Fork Wilderness and Robert S. Kerr Arboretum (America's Byways 2013).

The Osage Nation Heritage Trail Byway is a 70-mile (113-kilometer) roadway that runs from Bartlesville and Ponca City through the Osage Reservation and Pawhuska, the capital of the Osage Nation. While mostly cultural in value, the roadway's highlights include the Osage Tribal Museum, the Cathedral of the Osage, Constantine Theater, and the Million Dollar Elm Memorial (American Profile 2013).

Many outstanding aesthetic resources, designated scenic views, scenic roadways, and unique visual elements are located within the Planning Area in addition to large areas of agricultural, industrial, and urban development. In summary, many parts of the Planning Area are visually pleasing while other parts are highly impacted from human activity. Therefore, the Planning Area possesses a variable degree of aesthetic quality from low to high, spread over multiple regions and landscapes of Oklahoma.

3.11.2 Noise

Noise is defined as unwanted sound that disrupts or interferes with normal activities or that diminishes the quality of the environment. Noise is usually caused by human activity and is added to the natural, or ambient, acoustic setting of an area. Exposure to high levels of noise over an extended period can cause health hazards such as hearing loss; however, the most common human response to environmental noise is annoyance. Individuals respond to similar noise events differently based upon various factors that may include the existing background level, noise character, level fluctuation, time of day, the perceived importance of the noise, the appropriateness of the setting, and the sensitivity of the individual.

Noise-sensitive receptors are facilities or areas where excessive noise may disrupt normal activity, cause annoyance, or loss of business. Land uses such as residential, religious, educational, recreational, and medical facilities are more sensitive to increased noise levels than are commercial and industrial land uses. Numerous noise-sensitive receptors are located within the Planning Area, the majority of which are located within developed communities. Due to the vastness of the Planning Area, it is not reasonable or practical to identify all noise receptors adjacent to the applicant's existing oil and gas facilities. Nor is it possible to identify those adjacent to new facilities that could be constructed within the Planning Area because the location of those facilities is largely unknown.

Noise within the Planning Area is produced by a variety of human activities. Transportation, including road traffic (automobiles, tractor trailers, and motorcycles on U.S. Highways, State Highways, county roads, and residential streets), rail traffic, and air transportation causes a variety of noise at different levels throughout the Planning Area. Oil and gas industry activities throughout the Planning Area produce noise through drilling and construction of facilities. Construction of housing, commercial facilities, and roads increases noise within the Planning Area through use of bulldozers, backhoes, and other types of construction equipment. Agricultural equipment, such as tractors, is used throughout the Planning Area and increase noise levels.

3.12 SOCIOECONOMICS

The Planning Area encompasses 45 (58 percent) of the 77 counties in Oklahoma (Oklahoma Historical Society 2007). The U.S. Census Bureau (2010) shows that between 2000 and 2010 a majority of the counties in the Planning Area grew in population by an average of approximately 7.93 percent, ranging from a population decline of –4.05 in Ottawa County, Oklahoma, to an increase of 27.12 percent in Wagoner County, Oklahoma. The majority of the counties are projected to grow at an average of 20.43 percent between 2010 and 2040. The area with the lowest growth is expected to be Seminole County, Oklahoma, with a decline of –11.3 percent and the highest growth rate of 47.5 percent is expected in Cleveland County, Oklahoma (Oklahoma Department of Commerce 2012a).

Socioeconomic information for each Workforce Investment Area for Oklahoma that occurs within the Planning Area is presented in Table 3-8. The information presented in this table provides a general description of the major population centers and employment sectors within the Planning Area. The counties, major cities, and their population, and the major employment sectors within each area are also presented in Table 3-8. For clarity, only those employment sectors that make up substantial percentages of total employment are listed.

3.13 ENVIRONMENTAL JUSTICE

Federal agencies strive to ensure that their actions support environmental justice ideals by identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies, and activities on low-income and minority populations in the United States (59 *FR* 7629 1994 WL 43891 [Pres], Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) (U.S. Environmental Protection Agency 1994). The U.S. Department of the Interior's environmental justice policy requires that U.S. Department of the Interior bureaus "consider the impacts of their actions and inactions on minority and low-income populations and communities, as well as the equity of the distribution of benefits and risks of those decisions in NEPA documents.

TABLE 3-8

SOCIOECONOMIC DATA BY WORKFORCE INVESTMENT AREA WITHIN THE PLANNING AREA

Workforce Investment Area/Regions	Counties in Planning Area	Population of Largest Cities	Agr., Forestry, Fishing& Hunting	Retail	Construction	Professional, Scientific	Manufacturing	Financial Activities	Mining	Government	Healthcare
Cleveland County is part of Oklahoma City MSA	Cleveland	Norman 110,925	0.1	10.6	5.6	4.9	5.6	4.5	<1.0	1.2	9.4
South Central	McClain	Purcell 5,884	8.0	12.0	6.0	3.0	6.0	4.0	5.0	27.0	8.0
Tulsa	Osage, Tulsa, Creek,	Tulsa 391,906	2.0	11.0	6.0	7.0	9.0	6.0	3.0	9.0	11.0
East Central	Lincoln, Okfuskee, Pottawatomie, Seminole	Shawnee 29,857	13.0	10.0	7.0	4.0	7.0	3.0	8.0	19.0	10.0
Southern	Atoka, Bryan, Carter, Coal, Johnston, Garvin, Love, Marshall, Murray, Pontotoc	Durant 15,856	9.0	11.0	5.0	3.0	6.0	4.0	7.0	22.0	10.0
Northeast	Craig, Delaware, Mayes, Nowata, Ottawa, Rogers, Washington	Miami 13,570	8.0	11.0	8.0	3.0	9.0	3.0	3.0	14.0	9.0

TABLE 3-8 (Cont'd)

Workforce Investment Area/Regions	Counties in Planning Area	Population of Largest Cities	Agr., Forestry, Fishing& Hunting	Retail	Construction	Professional, Scientific	Manufacturing	Financial Activities	Mining	Government	Healthcare
Eastern	Adair, Cherokee, McIntosh, Muskogee, Okmulgee, Sequoyah, Wagoner	Muskogee 70,990	9.0	11.0	6.0	3.0	7.0	4.0	2.0	23.0	11.0
Southeast	Choctaw, Haskell, Latimer, Le Flore, McCurtain, Pittsburg, Pushmataha	Wilburton 2,843	12.0	10.0	7.0	3.0	8.0	3.0	4.0	20.0	9.0
North Central	Kay, Noble, Payne	Stillwater 45,688	8.0	9.6	5.4	4.1	7.7	3.3	5.5	20.5	8.2

Sources: Oklahoma Department of Commerce (2012b–j); U.S. Department of Labor (2012).

The composition and distribution of minority populations within the Planning Area are described in Table 3-9. The county with the lowest percentage of ethnic minorities is Lincoln County, Oklahoma, at 14 percent. The county with the greatest percentage of ethnic minorities is Adair County, Oklahoma, at 57 percent (U.S. Census Bureau 2010).

TABLE 3-9
ETHNICITY CHARACTERISTICS
WITHIN THE PLANNING AREA BY COUNTY

County	Total Population	White Population		Ethnic Minorities Population	
		Number	Percent	Number	Percent
Adair	22,683	9,757	43	12,926	57
Atoka	14,182	10,460	74	3,722	26
Bryan	42,416	32,316	76	10,100	24
Carter	47,557	35,380	74	12,177	26
Cherokee	46,987	24,567	52	22,420	48
Choctaw	15,205	9,866	65	5,339	35
Cleveland	255,755	202,811	79	52,944	21
Coal	5,925	4,402	74	1,523	26
Craig	15,029	10,017	67	5,012	33
Creek	69,967	55,764	80	14,203	20
Delaware	41,487	27,811	67	13,676	33
Garvin	27,576	22,462	82	5,114	19
Haskell	12,769	9,560	75	3,209	25
Hughes	14,003	9,543	68	4,460	32
Johnston	10,957	8,015	73	2,942	27
Kay	46,562	37,332	80	9,230	20
Latimer	11,154	7,825	70	3,329	30
Le Flore	50,384	37,827	75	12,557	25
Lincoln	34,273	29,426	86	4,847	14
Love	9,423	7,426	79	1,997	21
McClain	34,506	29,168	85	5,338	15
McCurtain	33,151	22,259	67	10,892	33
McIntosh	20,252	14,238	70	6,014	30
Marshall	15,840	11,690	74	4,150	26
Mayes	41,259	28,044	68	13,215	32
Murray	13,488	10,515	78	2,973	22
Muskogee	70,990	42,467	60	28,523	40
Noble	11,561	9,740	84	1,820	16
Nowata	10,536	7,267	69	3,269	31

TABLE 3-9 (Cont'd)

County	Total Population	White Population		Ethnic Minorities Population	
		Number	Percent	Number	Percent
Okfuskee	12,191	7,848	64	4,343	36
Okmulgee	40,069	26,366	66	13,703	34
Osage	47,472	31,327	66	16,145	34
Ottawa	31,848	21,969	69	9,879	31
Pawnee	16,577	13,363	81	3,214	19
Payne	77,350	63,353	82	13,997	18
Pittsburg	45,837	33,745	74	12,092	26
Pontotoc	37,492	26,687	71	10,805	29
Pottawatomie	69,442	52,969	76	16,473	24
Pushmataha	11,572	8,675	75	2,897	25
Rogers	86,905	65,415	75	21,490	25
Seminole	25,482	17,450	69	8,032	32
Sequoyah	42,391	28,204	67	14,187	33
Tulsa	603,403	417,413	69	185,990	31
Wagoner	73,085	55,340	76	17,745	24
Washington	50,976	39,929	78	11,047	22

Source: U.S. Census Bureau (2010).

The U.S. Department of Health and Human Services defines the poverty guideline for the continental U.S. in 2012 for a family of four as $23,050 (U.S. Census Bureau 2012). According to the U.S. Census Bureau (2012), in 2012 the median household incomes of the Planning Area counties ranged from $28,587 in Pushmataha County to $58,761 in Rogers County, Oklahoma. None of the counties within the Planning Area has a median household income less than the U.S. Department of Health and Human Services poverty guideline.

3.14 TRIBAL JURISDICTION

A significant portion of Oklahoma is under tribal jurisdiction; 37 are federally recognized tribes with boundaries in Oklahoma, 25 of which are located partially or wholly within the Planning Area. These include:

- Absentee Shawnee Tribe
- Alabama Quassarte Tribal Town
- Cherokee Nation
- Chickasaw Nation
- Choctaw Nation
- Citizen Potawatomi Tribe
- Eastern Shawnee
- Kialegee Tribal Town
- Kickapoo Tribe
- Miami Nation

- Modoc Tribe
- Muscogee (Creek) Nation
- Osage Nation
- Ottawa Tribe
- Otoe-Missouria Tribe
- Pawnee Nation
- Peoria Tribe
- Quapaw Tribe
- Sac and Fox Nation
- Seminole Nation
- Seneca-Cayuga Tribe
- Shawnee Tribe
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokees
- Wyandotte Nation

These tribal jurisdictions have their highest concentrations in the central portion of the state, and in the extreme northeastern portion of the state, but are scattered throughout. The only Indian Reservation located within the Planning Area, the Osage Indian Reservation, matches the boundaries of Osage County. This county is situated in the northwestern portion of the Planning Area, which is in the north-central part of Oklahoma, bordering Kansas.

3.15 CULTURAL RESOURCES

Cultural resources are prehistoric and historic archeological sites, districts, structures, or locations considered significant to a culture, a subculture, or a community for scientific, traditional, religious, or other reasons. The prehistoric settlement system in a region usually reflects economic activities that support the population of a given area. In a hunting and gathering economy, the settlement system may consist of seasonal encampments, temporary procurement stations, and locations for obtaining special resources. An agrarian system, in contrast, might contain trade centers, production villages, and few, if any, temporary procurement stations. Certain considerations regarding the decision to occupy one place or another are common to all settlement systems. Primary among these considerations is access to the resources needed to physically sustain life, including potable water, food, and the specialized items needed to obtain and process food. Secondarily, defensibility and protection from the natural elements, such as flooding, wind, and rain, would be considered. Access to trade routes is also important in certain systems.

Prehistoric archeological resources may include rockshelters, lithic scatters, flaked stone scatters, rock rings or alignments, tool procurement sites, thermal features/roasting pits with artifact scatters, and rock art locations. Well-known prehistoric archeological sites in the Plan Area include the following: the Packard site, the Lawrence site, the Harlan Mound site, the Norman Mound site, the Spiro Mound site, the Thunderbird Dam site, the Haley's Point site, the Raulston-Rogers site, the Rose-Fast site, the Primrose and Stillman Pit sites, and the Brewer Site.

The Planning Area continued to be inhabited through the historic period. Historic sites may include buildings, structures, features such as mine shafts, transportation routes, bridges, refuse deposits,

historic homes and/or associated property (including rock walls, pens, corrals, water/soil retention structures, and cisterns), cemeteries, trails, and rural schools.

Additionally, the National Historic Preservation Act of 1966, as amended in accordance with 36 CFR 800 and the Archaeological Resources Protection Act of 1979, as amended, among other state and Federal regulations require Federal agencies to take into account the effects of their undertakings on prehistoric or historic district, site (including archeological), building, structure, or object included in, or eligible for inclusion the National Register of Historic Places, including making a good faith effort to identify resources listed or eligible for inclusion in the National Register of Historic Places, as well as to try to mitigate or lessen adverse effects on these resources.

Using the National Park Service's National Register of Historic Places database, National Historic Landmarks program, and Geographic Resources Program National Historic Trails Map Viewer, as well as the Oklahoma Historical Society's National Register of Historic Places in Oklahoma, Oklahoma OLI websites, and Atkins in-house list of the Oklahoma Historical Society's Determinations of Eligibility, numerous previously recorded cultural resources were identified within the ICP Planning Area. These previously recorded cultural resources include the following:

- 15 National Historic Landmarks
- 1 National Historic Trail
- 1 National Historic Site
- 738 National Register of Historic Places
- Over 84 cemeteries
- 27,276 properties recorded in the Oklahoma Landmark Inventory
- 129 bridges recorded in the Oklahoma Landmark Inventory
- At least 715 resources determined eligible for inclusion in the National Register of Historic Places by the Oklahoma State Historic Preservation Office.

Additional previously recorded and unrecorded cultural resources may also occur within the Planning Area and may be encountered and/or impacted.

4.0 ENVIRONMENTAL CONSEQUENCES

The impact analysis in this EA includes the No-Action Alternative, which provides a baseline condition to which the Proposed Alternative can be compared. The No-Action Alternative describes the future conditions that can be expected if the ICP is not approved, so that the oil and gas industry would continue to coordinate with the Service on an as-needed, project-specific basis. Under the No-Action Alternative, covered activities described in Section 2.2, and compliance with the ESA, would still continue throughout the 22-year term of the ICP (the duration of the ICP).

Under the Proposed Alternative, the proposed action is approval of the ICP and issuance of multiple section 10(a)(1)(B) incidental take permits by the Service to oil and gas industry applicants. The ICP and subsequent incidental take permits would be in effect for a maximum of 22 years from the date of approval (new construction may be covered for 24 months after Permit issuance, whereas operation and maintenance activities may be covered for up to 20 years after Permit issuance). Issuance of the incidental take permit results in authorization of incidental take of the covered species within the Planning Area without completing separate coordination with the Service for ESA compliance, which may facilitate reliable production at a reasonable cost.

Effects from covered activities are identified for each resource as being either direct or indirect. Under these two types of impact, the effects could be either beneficial or adverse. These terms are defined below and are based on the controlling definitions for terms under Council on Environmental Quality's NEPA regulations (40 CFR 1508):

- *Direct Impact:* An effect that is caused by an action and occurs in the same time and place.
- *Indirect Impact:* An effect that is caused by an action but is later in time or further removed in distance, but is still reasonably foreseeable.
- *Adverse Impact:* A change that moves the resource away from a desired condition or detracts from its appearance or condition.
- *Beneficial Impact:* A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

An estimated cumulative 37,569 acres (15,204 hectares) of the 22,858,163-acre/9,250,370-hectare) (35,716-square mile/92,504-square kilometer) Planning Area may be directly impacted by oil and gas activities. Impacts under the Proposed Alternative would result from covered activities, potentially including an estimated 2,030 miles (3,267 kilometers) of pipeline; 193 miles (311 kilometers) of roads (158 miles [254 kilometers] of permanent roads associated with wells, 30 miles [48 kilometers] of temporary roads associated with wells, and 5 miles [8 kilometers] associated with pipelines); 3,319 well pads (approximately 4 acres [1.6 hectares] each); and 230 miles (370 kilometers) of electric distribution lines.

Following the resource-by-resource analyses of direct and indirect impacts from covered activities in this section, the following sections present analyses of cumulative impacts (Section 5), irreversible and irretrievable commitment of resources (Section 6), and short-term use of the environment versus long-term productivity (Section 7).

4.1 GEOLOGY

4.1.1 No-Action Alternative

Under the No-Action Alternative, impacts to geology would occur at the surface or near-surface level, as well as deeper for downhole operations (drilling, hydraulic fracturing). Surface impacts mostly result from construction of surface or near-surface facilities (construction of well pads, pipelines, roads, etc.) and the additional surface space required to supply fluids and materials to the drilling/hydraulic fracturing operation—heavy equipment storage, ponds, and miles of temporary surface pipelines. Drilling and hydraulic fracturing impacts to geology may result in microseismic events (Ellsworth 2013). Opponents to hydraulic fracturing contend that the process is responsible for an increased magnitude of seismic activity (earthquakes), but U.S. Geological Survey studies suggest that the actual hydraulic fracturing process is only very rarely the direct cause of felt earthquakes (USGS 2014). However, increased earthquakes are more likely a result of injection of wastewater into disposal wells. Impacts to deep geology are likely to be minor and not significant because of standard industry safety procedures, including but not limited to continuous monitoring and working in stages. However, these impacts could be significant if studies planned by the U.S. Geological Survey and the Bureau of Land Management show the increased number and magnitude of earthquakes in the region, including the Planning Area, are the result of wastewater injection.

Pipeline trench excavation would typically be 8 feet (2.4 meters) deep or less and usually above existing bedrock. In most cases impacts to the bedrock would be expected to be minimal, and largely limited to areas where bedrock is within 8 feet (2.4 meters) of the surface. In these cases, rock ripping could be necessary. Ripping is a method of loosening rock during excavation using steel tynes attached to the rear of bulldozers. The tynes are lowered into the ground as the bulldozer moves forward and soil or blocks of rock are displaced by the tynes. Construction of pipelines, well pads, and associated facilities requires the clearing of vegetation and the removal of small amounts of surface material, resulting in the potential for soil erosion. With pipelines in place, the previously excavated trenches would be filled with the original earthen material. Similarly, impacts to surface water crossings and construction/maintenance corridors are expected to be temporary.

In the absence of the ICP, each applicant would coordinate with the Service on a project-by-project basis, if the applicant determined it was necessary (within the ABB's range with the possibility of impacting ABB habitat). Throughout the Planning Area, any temporary water crossings or access corridors created during construction/maintenance would be returned to preconstruction contours. Rock and soil material would be returned to fill the trench once the pipeline is placed

underground. Overall, impacts to surficial geology would be negligible, providing standard procedures were implemented.

4.1.2 Proposed Alternative: ICP with a 22-year Duration

Impacts to geology from covered activities would mirror impacts seen in the No-Action Alternative. Because most impacts to surface geology would be temporary, impacts to geological resources are not expected to be significant.

4.2 SOILS, INCLUDING PRIME AND UNIQUE FARMLAND

4.2.1 No-Action Alternative

Activities involving new well pads and/or pipelines include vegetation clearing, grading, trenching, laying the pipeline, backfilling, cleanup, and restoration. Other activities include any necessary new electric transmission or distribution lines associated with pipeline pump stations, the grading of temporary roads, construction areas, staging areas, and clearing of source and receiver lines during geophysical exploration. In general, potential effects on soils from these activities include compaction (both short term and long term), temporary and short-term erosion, some loss of topsoil, soil mixing, and temporary to permanent soil contamination.

Some potential for soil disturbance would occur during the initial clearing of the vegetative cover and underlying topsoil layer, where necessary, at the construction sites and within the rights-of-way. To provide adequate space for construction activities, to minimize corridor maintenance problems, and to comply with safety codes, most woody vegetation is generally removed within the construction areas and rights-of-way. This could lead to or increase soil erosion. Soil erosion could also occur during the construction of the well pads and associated facilities, during the trenching process, and later during the storage of the excavated soil (stockpiles).

Clearing the rights-of-way for any associated electric distribution or transmission lines would result in less of an impact than laying pipelines because trenching would not be involved. Vegetation clearing could result in some soil erosion. In these areas, only the leaf litter and herbaceous vegetation would remain and both would be disturbed by the movement of heavy equipment, leading to compaction. Within cropland and/or pastureland, the rights-of-way would be temporarily unavailable for cultivation or grazing during construction of the power lines. Thus, overall impacts from oil and gas activities are typically minor.

Operation and maintenance activities typically have less of an impact than new projects because maintenance activities are less intense and occur only periodically. Right-of-way maintenance involves pruning or mowing the vegetation and so would have less impact on the soils than during the original construction. However, minor impacts from soil disturbance and compaction from mowing can be expected (minor, short term) because the mowers and some other maintenance

equipment are heavy enough to cause some compaction. As noted in Section 2.2, other maintenance activities include pump station maintenance, electric transmission/distribution line rebuilds, or replacement of wires.

Prime farmland soil occurs throughout the Planning Area in all counties, but most agricultural land uses are generally compatible with oil and gas projects because, apart from some permanent above ground facilities, in most cases normal agricultural practices can resume once construction has been completed. Undoubtedly, some areas where prime farmland soils exist would have pipeline rights-of-way passing through; however, the excavation of soil for pipeline placement would be temporary and, depending on the depth of trenching, any farming activities may resume once the soil has been refilled to its existing placement. Direct impacts to Prime or Unique Farmland soils are expected to be minor and limited to the physical occupation of small areas by pump stations or other above-ground pipeline infrastructure. Some upturned soil along the placement of the actual pipeline may lose some agricultural productivity if the underlying layer is of a less-desirable chemical makeup. NEPA and the Farmland Protection Policy Act, Federal agencies are required to coordinate with the National Resources Conservation Service if actions would irreversibly convert prime or unique farmlands to nonagricultural use.

Providing that standard industry procedures to avoid/minimize direct and indirect impacts are implemented in the absence of an ICP, impacts to soils under the No-Action Alternative are not expected to be significant.

4.2.2 Proposed Alternative: ICP with a 22-year Duration

Under the Proposed Alternative, impacts to water resources are expected to be the same as those described for the No-Action Alternative. Providing that minimization and mitigation measures described in Section 4.2 of the ICP are implemented, impacts to soils are expected to be minor and not significant because compliance with applicable laws and regulations are a required component of ICP implementation.

Any temporary water crossings or access corridors created during construction/maintenance would be returned to preconstruction contours. In addition, given that it is estimated that cumulatively, 37,569 acres (15,204 hectares) of the 22,858,163-acre/9,250,370-hectare (35,716-square-mile/92,504-square kilometer) Planning Area would be directly impacted by covered activities, impacts to soils under the Proposed Alternative are not expected to be significant.

4.3 WATER RESOURCES

4.3.1 No-Action Alternative

While construction would cause short-term disturbances resulting in potential direct impacts to water resources, these potential impacts would be minimal and localized as a result of efforts to

minimize soil erosion and waterway sedimentation. Vegetation removal would result in increased erosion potential in the affected areas, so that slightly higher-than-normal sediment yields would be delivered to area waterways during a heavy rainfall. These short-term effects would be minor, however, as a result of the relatively small area to be disturbed at any particular time and the short duration of the construction activity. To maximize the protection of water resources, special care would be exercised when clearing near waterways. Vegetation on the stream banks would be left intact where possible and as appropriate for the project and, where vegetation is removed, these areas would be stabilized immediately following construction activity. Most pipeline stream crossings would use the open-cut method, whereas other crossings would be bored under the stream. Upon completion of the crossing, the banks would be restored to preconstruction contours, revegetated, and mulched. Erosion and sedimentation controls would also be in place. Operation and maintenance activities are expected to have little impact on surface water resources.

During drilling and well development, water may be withdrawn for hydraulic fracturing and horizontal directional drilling operations (to prepare drilling mud), During pipeline construction, water may be withdrawn for hydrostatic testing, and dust control along the construction rights-of-way. Water withdrawals would take place from nearby rivers and streams, privately owned reservoirs, and/or private or public wells or water systems. For hydrostatic testing of longer pipeline segments, withdrawal volumes may be up to 100,000 gallons. Concern has also been raised over the increasing quantities of water required for hydraulic fracturing. However, surface water or ground water withdrawals for these purposes would require temporary permits from the Oklahoma Water Resources Board. For surface water withdrawals, the agency evaluates potential permits on a case-by-case basis to ensure that designated beneficial uses (including fish and wildlife uses) are maintained and water rights are protected (Oklahoma Water Resources Board 2014). Similarly, the Oklahoma Water Resources Board manages the state's groundwater. Temporary permits are issued for beneficial use, including industrial purposes. Groundwater permitting is site-specific and based on water availability within the respective basin. Groundwater permitting is designed to protect existing beneficial uses, including shallow, domestic wells (Oklahoma Water Resources Board 2014). Therefore, impacts associated with groundwater withdrawals are not expected.

Following standard industry procedures, if flowing water is present in waterbodies to be spanned, construction machinery and equipment would be transported around via existing roads to avoid direct crossings, where practicable. This would eliminate the necessity of constructing temporary waterbody crossings that might otherwise result in erosion, siltation, and disturbance of the waterbody and its biota. Where it is not practicable, temporary culverts and fill and/or low-water crossings would typically be used. Fill material may be brought in from an outside commercial source. Above ground clearing (i.e., use of chainsaws, hydroaxes, or similar methods) instead of bulldozing, if necessary at stream crossings, would be undertaken to minimize erosion problems. Highly erodible areas adjacent to streams (stream banks) would not be cleared unless necessary. Oil and gas activities in waters of the United States would be in compliance with USACE Nationwide

Permit requirements, if applicable at that time. Currently, such activities are restricted to those that do not result in the loss of greater than 0.5 acre (0.2 hectare) of waters of the United States and are permitted under Nationwide Permit 12, *Utility Line Activities*.

Construction activities would not impact obvious flood channels and thus would not significantly affect flooding. Permanent structures and roads associated with oil and gas activities within the 100-year floodplain would meet standards established by the governing flood-control authority so as not to impede the flow of water or create any hazard during flooding. Similarly, operation and maintenance activities are expected to have little impact on floodplains. Therefore, no significant impacts are anticipated for the No-Action Alternative.

4.3.2 Proposed Alternative: ICP with a 22-year Duration

Under the Proposed Alternative, impacts to water resources are expected to be the same as those described for the No-Action Alternative. No significant indirect site-specific or offsite impacts to surface and groundwater resources are expected as a result of the covered activities because. erosion and sedimentation controls would be implemented during all aspects of construction and maintenance activities within the Planning Area to avoid degradation of surface water. Providing that standard industry procedures to avoid/minimize direct and indirect impacts are implemented under the ICP, impacts to water resources within the Planning Area would be negligible to minor.

Under the Proposed Alternative, adherence to measures described in sections 1.5 and 1.6 of the ICP, and migratory birds and eagle avoidance measures and species take avoidance measures described on the Service website[3] could potentially result in decreased risk of impact to water resources (e.g., water withdrawals, modification to hydrology or stream morphology, increased or decreased runoff due to modifications to topography, increased sedimentation, or chemical releases where such activities could impact a noncovered species listed in Table 3-6) during implementation of covered activities. While these measures would only apply to limited areas in the ICP Planning Area where federally listed species, species proposed for listing, and the bald eagle may occur, they nevertheless represent a reduction in potential impacts to water resources. No significant impacts are anticipated under the Proposed Alternative because Oklahoma groundwater and surface water laws are intended to protect beneficial uses, including fish and wildlife resources; water take and water quality permits are issued on a case-by-case basis.. When an applicant proposes to drill a water well, a permit for the well is required and issued by the Oklahoma Water Resources Board. Only where adequate groundwater is available will permits be issued. This process is designed to protect groundwater resources.

[3] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

4.4 WATER QUALITY

4.4.1 No-Action Alternative

The main potential direct impact from oil and gas activities on surface water resources is siltation resulting from erosion and pollution from the accidental spillage of petroleum products (fuel, lubricants, etc.) or other chemicals during construction, operation, and maintenance activities. Efforts to reduce surface water impacts include discouraging littering in construction areas, removing surplus waste materials from the work site and storing/disposing of them properly for each project.

For hydrostatic testing, water withdrawal volumes may be up to 100,000 gallons. Large volume discharges of hydrostatic test waters into surface waters may cause a temporary change in the water temperature and dissolved oxygen levels and cause increase stream bank and substrate scour. However, discharge of hydrostatic test water would take place pursuant to Oklahoma's pollutant discharge elimination system permitting in order to ensure no adverse impacts to receiving waters and that beneficial uses are preserved. The Oklahoma Corporation Commission regulates the discharge of hydrostatic test water from pipelines or other vessels that are outside of the facilities regulated by the Oklahoma Department of Environmental Quality. Discharge of less than 1,000 barrels of test water from new pipelines can occur without a permit provided there is no visible sheen or discoloration and chlorides are less than 1,000 parts per million. For existing pipelines, the Oklahoma Corporation Commission must be notified and certain water quality criteria must be met (The Oklahoma Register 165:10-7-17).

Over recent years, broad concern has arisen regarding potential impacts to groundwater caused by hydraulic fracturing and drilling. Concern exists that hydraulic fracturing fluids may cause contamination both as it is injected under high pressure into the ground and as it returns to the surface. As the fracturing fluid flows back through the well, it consists of spent fluids and may contain dissolved constituents such as minerals and brine waters. However, groundwater impacts from this process are unlikely due to standard industry practices and the rules currently in place. Over the past 60 years, more than 100,000 wells were hydraulically fractured in Oklahoma and the State has not identified any instances where the process has harmed ground water (STRONG 2011). The Oklahoma Corporation Commission Rule 165:10-3-10(a) prohibits pollution of any surface or ground water. Protection of ground water is enhanced through casing and cementing requirements (Oklahoma Corporation Commission 165:10-3-4).

The effects of other activities on groundwater resources would be negligible and not significant because structures would be buried at a shallow depth (up to 8 feet [2.4 meters]). However, temporary increases in total suspended solids may occur where the water table is disturbed during trenching and excavation. Efforts would be made during construction for proper control and handling of any petroleum or other chemical products. To avoid and minimize contamination, oil

and gas companies are required to develop protocols to respond to potential spills as defined in the Spill Control and Countermeasures section of the Oil Pollution Act (40 CFR §112.3). The Spill Control and Countermeasures plans describe how a company would implement oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. Operation and maintenance activities are not expected to impact water quality.

4.4.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. No significant indirect impacts to site-specific or offsite impacts to water quality are expected as a result of the covered activities because erosion and sedimentation controls would be implemented during construction and maintenance activities and would prevent or minimize such impacts to water quality. Offsite surface waterbodies would likely be unaffected by construction-related litter, as these materials would be routinely removed from the work area and disposed of as required by state law.

Adherence to measures described in sections 1.5 and 1.6 of the ICP, and migratory birds and eagle avoidance measures and species take avoidance measures described on the Service's website[4] would potentially result in decreased risk of impact to water quality (e.g., water withdrawals, modification to hydrology or stream morphology, increased or decreased runoff due to modifications to topography, increased sedimentation, or chemical releases where such activities could impact a noncovered species listed in section 4.9.2 below) during implementation of covered activities. While these measures would only apply to limited areas in the ICP Planning Area where federally listed species, species proposed for listing, and the bald eagle may occur, they nevertheless represent a reduction in potential water quality impacts. Impacts under the Proposed Alternative are expected to be short term and not significant because Oklahoma groundwater and surface water laws are intended to protect beneficial uses, including fish and wildlife resources; water take and water quality permits are issued on a case-by-case basis.

4.5 AIR QUALITY

4.5.1 No-Action Alternative

Under the No-Action Alternative, the localized temporary effects of fugitive dust and the emissions from heavy equipment during construction and maintenance are not expected to result in long-term impacts to air quality. Waste gas from the gas production sites (from drilling and hydraulic fracturing) that contain hydrogen sulfide (H_2S) and other sulfur compounds are typically flared for disposal. The waste gas routed to the flare is burned as it exits the flare stack and would thus

[4] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

minimize emissions of hydrogen sulfide to the atmosphere. The combustion of this waste gas would result in the conversion of hydrogen sulfide to sulfur dioxide (SO_2) and the formation of other products of combustion including nitrogen oxides (NO_X), carbon monoxide (CO), and carbon dioxide (CO_2) gases that would be emitted to the atmosphere. Because flaring of the produced gas may be considered a temporary occurrence once the wellhead has been brought to completion, the impacts of these air contaminants are also considered to be temporary in nature. Therefore, impacts to air quality are expected to be short term and not significant.

All Planning Area counties are currently in attainment for all air quality criteria pollutants, so oil and gas activities should not result in violations of the State Implementation Plan. In the unlikely case that violations occur, such instances would be handled on a case-by-case basis, as needed.

4.5.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative—short term and not significant. During construction, ambient concentrations of fugitive dust and emissions are expected to decrease rapidly with increasing distance from the source so that off-property particulate levels would rarely exceed current ambient levels. Overall, impacts to air quality from covered activities are expected to be negligible to minor, short term, and not significant. Waste gas from the gas production would typically be flared for disposal. No significant indirect site-specific or offsite impacts to air quality are expected as a result of the covered activities.

4.6 VEGETATION

4.6.1 No-Action Alternative

Under the No-Action Alternative, the oil and gas industry would continue to build new and maintain existing oil and natural gas pipelines, well pads, and associated facilities within the Planning Area. Vegetation would be affected by activities occurring within the Planning Area and may include changes to the existing levels of native vegetation, removal of nonnative plants or noxious weeds from native vegetation communities (a beneficial impact), or replacement of substantial or important components of native vegetation communities with nonnative plants (an adverse impact). Impact intensity depends on the types and quantities of vegetation that are removed, the amount of time it takes for vegetation to regenerate, and the intervals in which the pipeline rights-of-way are regularly maintained. The areal extent affected during construction associated with new projects would be primarily dependent on the type of facility and dimensions of the easements.

Direct impacts to vegetation resulting from oil and gas activities would be associated with geophysical exploration, construction of new facilities, and maintenance of existing facilities. The direct impacts of new oil and natural gas pipeline projects on vegetation communities can be divided into short-term effects resulting from physical disturbance during construction and long-

term effects resulting from habitat modification and fragmentation. The net effect on local vegetation of these two types of impacts is expected to be relatively minor and not significant.

The primary direct impact to vegetation associated with new projects would be the removal of existing woody vegetation from the areas required for the rights-of-way and other facilities. The greatest amount of vegetation clearing would be required in wooded areas, while minimal clearing would be necessary in grasslands or agricultural lands. The amount of forested areas lost or fragmented for new pipeline projects, including well pads and other permanent facilities, would depend on the project. Within cropland and/or pastureland, the pipeline rights-of-way would be temporarily unavailable for cultivation or grazing during construction. Once construction is completed, however, herbaceous species would be allowed to recolonize within the rights-of-way and the rights-of-way would be used as the landowner desires, subject to some restrictions related to safety issues. Permanent facilities such as well pads located in cropland would result in a permanent loss. In general, impacts to land cultivated for crops should be short term, provided that standard procedures are adhered to so that the soil is not compacted and topsoil does not become mixed with subsoil of different chemical composition. Apart from well pads and other necessary above ground facilities, little if any land would be lost to cultivation as a result of the activities.

Once construction has been completed, natural recovery of the herbaceous vegetation within the rights-of-way would occur. After vegetation has been removed and the soil has been disturbed from project activities, the reestablishment of vegetation communities could be hindered by invasive species and noxious weeds. To minimize erosion, each oil and gas industry applicant would reseed disturbed soils with native species similar to adjacent vegetation immediately following construction to reduce potential erosion impacts, promote revegetation of native herbaceous cover, and facilitate natural succession to promote recovery from project disturbances. Each applicant would use a mix of native species unless the landowner objects. For areas that are cleared during the winter months, disturbed areas will be stabilized, as necessary. These areas would be replanted with native species when seasonally appropriate, with landowner concurrence.

The construction of some new linear projects would result in fragmentation of the existing ecological communities. The inevitable fragmentation of contiguous habitat blocks, the severance of riparian forest corridors, and the potential modifications of hydrologic and nutrient cycling and transfer processes are also likely to have an impact on natural communities. Wetland and aquatic systems would be impacted to a lesser degree since these types of features can typically be returned to preconstruction contours following placement of buried structures. More discussion on the effects of fragmentation appears in Section 4.8.

Maintenance of rights-of-way typically involves mowing or pruning the vegetation, but has much less of an impact than original construction activities because the area has already been disturbed. Maintenance activities, such as mowing, which typically involves a tractor and bush hog, would limit reestablishment of woody species.

Clearing of vegetation within new rights-of-way, well pads, and other permanent above ground facilities may indirectly affect adjacent vegetation outside of these areas. Such potential indirect impacts to vegetation typically occur with any construction activity and include accumulation of fugitive dust on vegetation adjacent to the construction area, thereby temporarily reducing primary production; sedimentation of downstream plant communities as a result of soil erosion; and increasing the availability of sunlight and wind exposure along the newly created edge of the rights-of-way and permanent facilities. Fueling should occur in already impacted, or to be impacted, areas and vehicle/equipment maintenance would usually prevent oil/grease spills. Thus, offsite pollution of adjacent plant communities as a result of runoff carrying oil and grease from heavy equipment would be negligible.

The degree of potential impact depends on the vegetation community. New pipelines, well pads, and associated facilities in grassland or urban areas would have much less potential impact than new projects crossing or within forested areas.

New land development associated with population growth in the Planning Area but outside of each oil and gas industry applicant's activities, could result in replacement of native vegetation with impervious cover and landscaping that often consists of nonnative vegetation. While some non-native or introduced species, such as Chinese lespedeza (*Sericea lespedeza*) and cheatgrass (*Bromus tectorum*), as well as native species, may encroach into the rights-of-way after pipeline installation, regular mowing and use of selective herbicides would inhibit the establishment of these and similar species within the rights-of-way.

Waste gas from the gas production sites that contain hydrogen sulfide and other sulfur compounds are typically flared for disposal. The combustion of this waste gas would result in the conversion of hydrogen sulfide to sulfur dioxide and the formation of other products of combustion including nitrogen oxides, carbon monoxide, and carbon dioxide gases that would be emitted to the atmosphere. The sulfur dioxide and nitrogen oxides emissions may dissolve in moisture in the atmosphere forming acidic droplets that may contribute to the formation of acid rain, leading to the acidification of soils and potential change in the vegetation community (U.S. Environmental Protection Agency 2012). This impact, however, is not expected to be significant.

Each applicant would coordinate with the Service on a project-by-project basis, if the applicant determined it was necessary. If the project had a Federal nexus, section 7 would be implemented. If the project had no Federal nexus, an HCP could be prepared. In both cases, avoidance, minimization, and conservation measures would be established to protect the ABB or other federally listed species. While it is understood that not all areas in the 45-county General Conservation Plan Planning Area contain ABB habitat, in some cases where ABB habitat does occur, these vegetation types would be preserved on a project-by-project basis. However, some ABB habitat would be impacted permanently, some would result in permanent cover change, and some would be impacted only temporarily. Preservation would mostly come in the form of mitigation. Within ABB

habitat, provided that mitigation measures under some other mechanism (Section 7 consultation or HCP) would be implemented, they would indirectly protect the vegetation so that the level of impact would not be significant.

Indirect impacts would be minimized by implementing measures such as proper runoff and erosion control, fugitive dust suppression, and control and removal of accidental spills of fuel or waste oil during construction. As soon as practical after construction is complete, exposed soils would be stabilized. Thus, many of these impacts would be short term. Indirect impacts as a result of maintenance activities would be similar, but to a much lesser degree. Overall, impacts to vegetation from these activities under the No-Action Alternative would be minor to moderate and not significant.

4.6.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. In ABB habitat mowing would be restricted to a height of 8 inches (20 centimeters). However, impacts to vegetation would be reduced through use of minimization and mitigation measures described in Section 4.2 of the ICP, as vegetation impacted by temporary or permanent cover changed impacts to the ABB would be restored within 5 years from the initial impact. Composition of adjacent vegetation communities could also be potentially impacted by the unintentional spread of exotic/invasive species, such as nonnative grass species planted in the rights-of-way, into previously undisturbed (i.e., native) portions of the Planning Area. In addition, unintentional and/or illegal introductions of exotic/invasive plant species could potentially be facilitated by increased human access to undisturbed areas. To offset impacts from invasive species, applicants will coordinate with the Service to develop and implement an invasive species control plan.

If herbicides are anticipated to be used, they would be applied by licensed applicators in accordance with label directions. Herbicides necessary for vegetation maintenance or removal would be hand applied, (herbicides determined to be detrimental to the ABB will be disallowed) or through specific broadcast application measures, to minimize spray drift.

Some level of positive benefits would be expected from the Proposed Alternative because avoidance, minimization, conservation, and mitigation measures stipulated in the ICP would allow a more consistent and coordinated approach over the entire 45-county Planning Area for 22 years, instead of working and planning on a localized level as would occur under the No-Action Alternative. As with the No-Action Alternative, while it is understood that not all areas in the 45-county ICP Planning Area contain ABB habitat, in some cases where ABB habitat does occur, these vegetation types would be preserved. However, some ABB habitat would be impacted permanently, some would result in permanent cover change, and some would be impacted only temporarily. Preservation would mostly come in the form of mitigation. While the Proposed Alternative would have minor to moderate, long-term adverse impacts on some native vegetation, given the prevalence of

native vegetation in the Planning Area, these impacts are not expected to be significant. In addition, given that an estimated 37,569 acres (15,204 hectares) of the 22,858,163-acre/9,250,370-hectare (35,716-square-mile/92,504-square kilometer) Planning Area would be directly impacted by oil and gas activities, impacts to vegetation under the Proposed Alternative are not expected to be significant.

4.7 WETLANDS/WATERS OF THE U.S.

4.7.1 No-Action Alternative

Under the No-Action Alternative, the oil and gas industry would continue to build new and maintain existing oil and natural gas pipelines and associated facilities within the Planning Area. Wetland communities within the Planning Area, particularly those associated with river systems, likely play an important role in flood and erosion control, reduction of water pollution, and wildlife habitat. Direct impacts to wetlands resulting from oil and gas activities would be associated with geophysical exploration, construction of new facilities, and maintenance of existing facilities. The direct impacts of new oil and natural gas pipeline projects on wetlands can be divided into short-term effects resulting from physical disturbance during construction and long-term effects resulting from wetland modification.

The ability of wetlands to perform ecosystem functions may be impacted during construction and maintenance activities in or around wetlands. Oil and gas activities would possibly affect waters of the U.S., including wetlands, by: potentially increasing turbidity and sedimentation; modifying water chemistry due to sediments, nutrients and pollutants; increasing soil erosion and soil compaction; destroying vegetative cover and topsoil; disturbing wildlife; and altering water flow (i.e., channelization and water level changes), and circulation patterns (Adamus and Stockwell 1983, Darnell et al. 1976). Potential impacts also include loss due to backfilling or draining. The effects of construction primarily fall into two categories: (1) the immediate impacts that would occur during the construction phase; and (2) the long-term effects or permanent changes caused by the pipelines, well pads, and associated facilities, or through related management practices (Darnell et al. 1976).

In particular, larger intact undisturbed forested wetland areas that have not been disturbed in recent history provide important wildlife habitat. The structural and species diversity of the vegetation in these communities forms foraging, sheltering, breeding, and nesting habitat for a variety of wildlife species. Clearing activities disturb the structure of the forest and the natural water flow through the floodplain, as evidenced by drainage ditches and by pooling in ruts and gouges created by clearing operations. As cleared areas revegetate, a different assemblage of vegetation and wildlife species may occur.

The initial clearing of the land during construction removes the vegetative cover and underlying topsoil layer. These activities, whether taking place in grassland or marsh communities, increase

the surface runoff and, subsequently, erosion. Runoff and erosion add soil solids to drainage areas and tributaries and eventually into wetland areas, manifested through increased water turbidity and sedimentation. High turbidity is one of the primary construction site impacts (Shuldiner et al. 1979), as it diminishes the suitability of aquatic habitat for supporting vertebrates, invertebrates, phytoplankton, and rooted vegetation (Darnell et al. 1976; Environmental Quality Laboratory 1977). Impacts from operation and maintenance activities are similar to those for construction of new projects, but usually to a much lesser degree because the area has already been disturbed.

Impacts from erosion and sedimentation would be minimized by implementing control measures at the beginning of, during, and after construction, with monitoring conducted throughout the construction activity. Various means to limit erosion include the use of berms and revegetation. Placement of such structures would precede the actual construction activities, minimizing erosion impacts from the beginning. Each oil and gas applicant would reseed disturbed soils with native species similar to adjacent vegetation immediately following construction to reduce potential erosion impacts, promote revegetation, and facilitate natural succession towards recovery from project disturbances.

Impacts to wetlands are expected to be predominantly short term and minimal due to the avoidance of wetland communities, the minimization of impacts to these communities through regulatory measures protecting wetlands under Section 404 of the Clean Water Act of 1972, as amended, and policy mandating "no net loss" of wetlands. Where impacts are not minimal, mitigation in accordance with USACE regulations would be implemented, where required for compliance under a General Permit (i.e., Nationwide General Permit, Regional General Permit, or Programmatic General Permit) or an Individual Permit (i.e., Letter of Permission or Standard Individual Permit). Where anticipated impacts to wetlands are not minimal, further evaluation and in some cases separate NEPA review may be required to ensure that wetland impacts are appropriately mitigated.

Impacts under the No-Action Alternative are expected to be minor to moderate, long term, but not significant.

4.7.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. Each oil and gas applicant would use a mix of native species composition similar to the surrounding area or, if requested by the landowner, the same vegetation type that existed prior to impacts. For areas that are cleared during the winter months, disturbed areas would be stabilized, if necessary. These areas would be monitored and replanted with native species when seasonally appropriate.

No significant indirect/offsite impacts to wetlands are expected as a result of the covered activities except potential downstream sedimentation as described above. If forested wetlands are cleared, the increased sunlight would potentially alter the composition of wetland species adjacent to the

rights-of-way by reducing the number and/or density of shade-tolerant species, while increasing the number and/or density of those species better adapted to full or partial sun. Spread of invasive nonnative species could also result from vegetation clearing, although minimization and mitigation measures (described in Section 4.2 of the ICP) would reduce the spread of invasive species. Erosion and sedimentation controls, as well as other minimization and mitigation measures described in Section 4.2 of the ICP, would be implemented during all aspects of construction and maintenance activities within the Planning Area, thus reducing potential impacts to offsite wetlands.

4.8 GENERAL WILDLIFE

4.8.1 No-Action Alternative

Under the No-Action Alternative, the oil and gas industry would continue to build new and maintain existing oil and natural gas pipelines, well pads, and associated facilities within the Planning Area. General impacts to wildlife from oil and gas activities include the potential to cause negligible to minor direct and indirect adverse impacts through habitat changes, introduction of nonnative species, and other alterations to the natural balance of wildlife species. Wildlife in Oklahoma is protected under various local, State and Federal regulations. However, while these regulations protect wildlife to some degree, they do not always provide protection for wildlife habitat. New land development associated with population growth in the Planning Area unrelated to oil and gas activities, could replace areas of native vegetation that provide habitat for many wildlife species. In such cases, habitat could be replaced with impervious cover and landscaping that may consist of nonnative vegetation.

The direct impacts of new oil and natural gas projects, including well pads, pipelines, and associated facilities, on wildlife can be divided into short-term effects resulting from physical disturbance during construction and long-term effects resulting from habitat modification, fragmentation, and loss. The net effect on local wildlife of these two types of impacts is expected to be relatively minor and not significant because of the limited spatial extent and/or duration of impacts, the availability of identical habitat outside of impacted areas where wildlife may seek refuge, and the mobility of most species. Tables 3-2 through 3-5 lists the wildlife within the Planning Area that could be impacted by activities associated with geophysical exploration, construction of new facilities, and maintenance of existing facilities.

Any required clearing (including source and receiver lines during geophysical exploration) and other construction-related activities resulting from implementation of oil and gas activities would directly and/or indirectly affect most animals that reside or wander within potential rights-of-way and well pad sites. Larger and more-mobile species such as birds, deer, foxes, and squirrels would likely avoid the initial clearing, geophysical exploration, and construction activities and move into adjacent areas outside the rights-of-way and well pad sites. The actual construction process can temporarily create a physical barrier to wildlife movement, and some small animals could become

trapped in a pipeline trench, although some portions of the trench are typically left intact to allow escape in such circumstances.

It is possible that some small, low-mobility species such as some amphibians, reptiles, and mammals would be killed by the heavy machinery. Similarly, fossorial animals (i.e., those that live underground, such as moles and shrews) would possibly be negatively impacted as a result of soil compaction caused by heavy machinery as well as trenching activities during pipeline construction and well pad development. The increased noise and activity levels during construction and maintenance could potentially disturb breeding or other activities of species inhabiting the areas adjacent to the pipelines, well pads, and associated facilities. These impacts are expected in most cases, however, to be temporary. Although the normal behavior of many wildlife species would likely be disturbed during construction, the long-term impacts to those species would not be significant because of the temporary nature of noise and human activity impacts and the temporal and spatial separation of construction activities, such that the return interval and frequency of occurrence of such disturbance would be long term and infrequent. Wildlife in the immediate area would experience a slight loss of browse or forage material during construction; however, the prevalence of similar habitats in adjacent areas and regrowth of vegetation in the rights-of-way following construction would minimize the effects of this loss.

Maintenance activities within existing, managed rights-of-way and well pad sites would have much less of an impact on wildlife than construction of new rights-of-way and well pad sites because maintenance activities would be less intense and for a shorter duration than the original construction activities and would also occur in areas that have already been disturbed. Thus, the impacts are expected to be minor and temporary. Maintained rights-of-way typically provide habitat for smaller species such as amphibians, reptiles, birds, and small mammals that prefer edge habitat. Similar to construction of new rights-of-way and well pad sites, more-mobile species would typically move out of the area to avoid harm, whereas less-mobile species would be more susceptible to maintenance activities such as mowing, brush removal, and pruning. The impacts to wildlife of noise from human and vehicular activity would be minor and not significant because they would be less intense and of a shorter duration than during the clearing of new rights-of-way and well pad sites.

The carrying capacity of habitat for any particular species is dependent on the availability of limiting resources such as food, shelter, water, territory, and nesting sites (Dempster 1975). For the purpose of impact analysis, available habitats are assumed to be at their carrying capacity for the species that occur there. Activities such as vegetation clearing, vehicular traffic, installation of new pipelines, construction of well pads and other associated facilities, and maintenance activities such as mowing would likely displace individuals in the vicinity of the activities, forcing them into competition with residents of adjacent habitat for the available resources. The inevitable result of this increased pressure would be an eventual decrease in birthrate and/or increase in mortality until populations are reduced to levels that the habitat can support (Dempster 1975). The initial

stress created by displaced wildlife on adjacent habitat would potentially also produce changes in species composition and community dynamics (Adams and Geis 1981), possibly resulting in long-term effects. The clearing of tree cover from the pipeline rights-of-way, well pad sites, and associated workspaces adjacent to these areas could lead to the destruction of bat roosts and bird nesting habitat, as well as forest cover for a variety of mammals, reptiles, and insects. However, given the prevalence of suitable habitat in the Planning Area, these impacts would not be significant.

Once construction is completed and the herbaceous vegetation has recovered, some wildlife species would move back into vegetated portions of the rights-of-way. Species diversity of small mammals would possibly be greater within the rights-of-way than in adjacent habitats (Adams and Geis 1983). Clearing of pipeline rights-of-way, well pad sites, and associated facilities, while producing largely temporary negative impacts to some wildlife, generally improves the habitat for ecotonal or edge species, such as the eastern cottontail, white-tailed deer, Virginia opossum, and grassland species, particularly the white-footed mouse, hispid cotton rat, and eastern harvest mouse (Adams and Geis 1983).

The mowed rights-of-way would be detrimental to wildlife utilizing mid- and late-successional habitats, but would benefit wildlife utilizing early successional habitats. Thus, the rights-of-way would provide a feeding area for some birds such as the American robin, sparrows, and some small mammals, depending on the mowing regime (Leedy 1977). Less-frequently mowed grassy areas and shrubby or forested areas along the edge of the rights-of-way would provide feeding and nesting areas for some bird species and cover for a variety of wildlife (Leedy 1977, Adams and Geis 1983). Forest-nesting birds would be more vulnerable to nest predation or parasitism by edge species such as the blue jay, American crow, and brown-headed cowbird.

Several studies have indicated that forest habitat fragmentation has a detrimental effect on numerous avian species that show a marked preference for large undisturbed forested tracts, and individual species are not randomly distributed with regard to habitat patch size (Robbins et al. 1989, Terborgh 1989). Also, area-sensitive species requiring forest interior habitat are typically more sensitive to fragmentation than edge-adapted species and are particularly affected by predation, brood-parasitism, and other impacts on nesting success (Terborgh 1989, Faaborg et al. 1992). The severity of fragmentation on any given species is determined by the duration and seasonal timing of construction, sensitivity of the animal, and parameters such as food availability, climate, cover, and topography.

The amount of forested areas lost or fragmented for new oil and natural gas pipeline projects, including well pads and associated facilities, would depend on the project. Typically, this impact is minimized in the original routing of oil and natural gas pipelines and placement of the well pad sites and other associated features such as access roads and electric substations, by avoiding large tracts of contiguous forest/woodland, co-locating with existing infrastructure, and by cutting across

lands that have already been disturbed. If a new pipeline or well pad is built in an agricultural area, little impact to woodlands would result since the line and well pad would largely occur in cropland and pastureland.

During the construction, operation, and maintenance of future oil and gas facilities, pollutants such as oil and grease originating from machinery and construction-related activities could be introduced into wildlife habitat via accidental spills or leaks. These impacts are expected to be minimized by the implementation of spill prevention and control methods and proper inspection and maintenance of equipment. However, any escaping pollutant would potentially adversely affect surrounding vegetation and possibly limit its value as wildlife habitat.

Such pollutants would potentially affect not only wildlife directly, but also their food supply, causing illness or death. In some cases, the pollutants could bioaccumulate in the prey species, leading to gradual illness or mortality. Another potential indirect impact is increased sedimentation downstream from construction/maintenance sites, which may cause aquatic prey species to leave the area, reducing the available food supply. Fugitive dust resulting from construction and maintenance activities would also potentially impact wildlife habitat.

An unquantifiable effect from the displacement of wildlife to adjacent areas is anticipated through increased competition and exposure to predation. With increased human access during construction or maintenance activities, temporary offsite disturbance of wildlife such as disruption of feeding, nesting, sheltering, and/or nurturing would likely occur. Migration could potentially lead to an increased burden on existing resources in occupied habitat adjacent to the project site, potentially displacing local residents or causing competition among the immigrating individuals and the current resident individuals, ultimately leading to illness or mortality if the area is already at carrying capacity.

The changing composition of vegetative communities would potentially affect forage for wildlife species in areas adjacent to the project sites. The creation of edge habitat from well pad construction and along cleared pipeline rights-of-way would result in additional offsite impacts. These edge habitats could deter wildlife species from occupying habitat adjacent to the project sites. Alteration of native vegetation may also result in the introduction and proliferation of invasive plant species, particularly in grasslands or shrublands, causing wildlife individuals to leave the general project vicinity.

Vegetation clearing might also allow infestation of the imported red fire ant (which occurs throughout much of the Planning Area) within the pipeline rights-of-way, well pad sites, and associated facilities. If these fire ants spread into adjacent areas, they could alter the local invertebrate community and adversely affect the invertebrate prey of some herpetofaunal species, as well as directly impacting herpetofaunal species (Allen et al. 2004). Fire ants may also impact the

nesting success of some ground-nesting avian species, such as the northern bobwhite, by preying on nestlings (Allen et al. 2004).

These indirect impacts to wildlife would be minimized by implementing measures such as proper runoff and erosion control measures, fugitive dust suppression, and control and removal of accidental spills of fuel or waste oil during construction. As soon as practical after construction is complete, exposed soils would be stabilized. Indirect impacts as a result of maintenance activities would be similar, but to a much lesser degree because the activities would be less intense and for a shorter duration than the original construction activities and would also occur in areas that have already been disturbed. Overall, no significant direct or indirect impacts to wildlife are anticipated as a result of oil and gas activities.

Each applicant would coordinate with the Service but on a project-by-project basis, if the applicant determined it was necessary. If the project had a Federal nexus, section 7 would be implemented. If the project had no Federal nexus, an HCP could be prepared. In both cases, avoidance, minimization, and conservation measures would be established to protect the ABB or other federally listed species. While it is understood that not all areas in the 45-county ICP Planning Area contain ABB habitat, in some cases where ABB habitat does occur, these vegetation types serving as wildlife habitat for some species would be preserved on a project-by-project basis. However, some ABB habitat would be impacted permanently, some would result in permanent cover change, and some would be impacted only temporarily. Preservation would mostly come in the form of mitigation. Overall, the No-Action Alternative could have minor to moderate direct adverse impacts from oil and gas industry activities on wildlife in the Planning Area. However, provided that such measures are being implemented they would indirectly protect wildlife habitat so that the level of impact would not be significant.

4.8.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. The net effect on local wildlife of impacts is expected to be relatively minor and not significant because of the implementation of avoidance, minimization, and other conservation measures described in Section 4.2 of the ICP.

Impacts under the Proposed Alternative would result in some level of positive benefits because avoidance, minimization, conservation, and mitigation measures stipulated in the ICP would allow a more consistent and coordinated approach over the entire 45-county Planning Area for up to 22 years, instead of working and planning on a localized level as would occur under the No-Action Alternative. As with the No-Action Alternative, while it is understood that not all areas in the 45-county ICP Planning Area contain ABB habitat, in some cases where ABB habitat does occur, these vegetation types serving as wildlife habitat would be preserved. However, some ABB habitat would be impacted permanently, some would result in permanent cover change, and some would be

impacted only temporarily. Preservation would mostly come in the form of mitigation. While the Proposed Alternative would have minor to moderate, long-term adverse impacts on wildlife, these impacts are not expected to be significant because of reasons stated above and because of the prevalence of wildlife in the Planning Area. In addition, given that an estimated 37,569 acres(15,204 hectares) of the 22,858,163-acre/9,250,370-hectare (35,716-square-mile/92,504-square kilometer) Planning Area would be directly impacted by covered activities, impacts to wildlife under the Proposed Alternative are not expected to be significant.

4.9 THREATENED AND ENDANGERED SPECIES

Take, as defined in section 9 of the ESA, is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any of these activities. Harm has been further defined to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. As described in the Service's 1996 HCP handbook (USFWS and National Marine Fisheries Service 1996), take can be measured in terms of the number of individuals affected or by the area of habitat affected, where it is generally assumed that all individuals occupying that habitat are taken. Take of listed plant species is not defined in the ESA, although the ESA does identify several prohibitions.

The following sections provide a description of potential impacts to the one covered species (ABB) occurring in the General Conservation Plan Planning Area, as well as other federally listed species, those species proposed for Federal listing, and Federal candidate species that also occur in the General Conservation Plan Planning Area. A comparison of the alternatives is also provided.

4.9.1 Covered Species

4.9.1.1 No-Action Alternative

The only covered species included in the ICP is the ABB. Under the No-Action Alternative, the current trend relating to the direct mortality and injury of individuals and the loss and fragmentation of habitat for the ABB within the Planning Area is expected to continue. The oil and gas companies would continue to construct, operate and maintain, and reclaim well pads, pipelines, and accompanying facilities, including access roads, electric distribution lines and substations, and offsite impoundments, within the Planning Area (see Section 2.2). Continuation of these activities would require authorization through coordination with the Service on a project-by-project basis; impacts would be negligible to minor because of the minimization and mitigation measures imposed by the Service.

Oil and gas activities within the Planning Area are likely to result in take of ABBs and impacts to their habitat. Take of ABBs in the form of mortality or injury to adults, larvae, or eggs may result from crushing and collision; impacts to breeding, feeding, and sheltering habitat; increased habitat fragmentation; and changes from one vegetation community to another.

Take of ABBs is expected to result from human and equipment movement and ground disturbance associated with construction and installation of well pads, pipelines, access roads, electrical distribution lines and substations, and off-site reservoirs. Operation and maintenance, and decommissioning of these activities are also expected to result in take of the ABB.

Take of ABBs and impacts to their habitat will differ with methodologies implemented and with ABB activity level when these activities occur. Expected differences, if anticipated, are described for the ABB's active and inactive seasons.

Activities occurring during the ABB active season could reduce the species' foraging and reproduction efficiency for the duration of the active season. Species used by ABB (for food and reproduction) and their habitat within project areas would be impacted, likely reducing the available food sources, decreasing reproductive potential, and decreasing use by ABBs in the area. Reduced availability of carrion may result from greater competition from vertebrate scavengers; this is especially true in those areas where forested ABB habitats are fragmented (Kozol 1995; Ratcliffe 1996; Amaral et al. 1997; Bedick et al. 1999). Installation of any permanent facilities (such as access roads) would remove ABB habitat used for breeding, feeding, or sheltering.

Potential impacts to the ABB would be avoided, minimized, and mitigated on a project-by-project basis through individual section 10(a)(1)(B) permits and section 7 consultations (where a Federal nexus exists) with the Service. Mitigation would be on a project-by-project basis and more likely to result in relatively small and isolated patches of habitat with relatively low long-term conservation value and with limited contribution to the species' recovery.

4.9.1.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. Although the ABB would be impacted by the activities through mortality or injury, habitat loss, and habitat fragmentation, because the precise number to be taken by the covered activities cannot be reasonably estimated, the ICP proposes to measure take in terms of the area of occupied ABB habitat affected by the covered activities, to the extent that the effects constitute take. Occupied ABB habitat is defined in the ICP as habitat suitable for ABB use and within the effective survey radius of a valid ABB survey where ABBs were identified or ABBs were assumed present because no surveys were conducted.

The ICP has estimated that of the 19,612,333 acres (7,936,830 hectares) of ABB habitat in the Planning Area, a cumulative 32,234 acres (13,045 hectares) may be impacted (authorized under the ICP) as a result of the covered activities throughout the 22-year term of the ICP. Estimated habitat impact acreages are broken down by upstream and midstream activities and by temporary, permanent cover change, and permanent impacts. The expected take of, or impacts to, the ABB as a result of the Proposed Alternative is not expected to reduce the potential for survival and recovery

of this species in the wild, as mandated by requirements of 50 CFR 17.22(b)(1)(iii). Specific impacts resulting in take will be analyzed in the Biological Opinion (BO) developed for the ICP.

The Service anticipates that implementation of the ICP may increase benefits to the ABB resulting from mitigation within the Planning Area, compared with the No-Action Alternative. The mitigation provided under the ICP would likely result in larger, contiguous tracts of land being protected, with greater conservation value, than would likely be achieved if similar acreage were protected on a project-by-project basis (No-Action Alternative). Increased mitigation through ESA compliance would benefit the species by ensuring that a larger portion of the anticipated habitat loss and degradation throughout the 22-year term of the ICP would be more comprehensively balanced with conservation actions, such as habitat protection and management in perpetuity. Furthermore, compliance under the ICP would be more efficient and more streamlined than obtaining project-by-project authorization through individual section 10(a)(1)(B) permits and section 7 consultations (where a Federal nexus exists) with the Service.

Adherence to the minimization and conservation measures described in the ICP would minimize or preclude take of ABBs through direct and indirect impacts to ABB habitat. In instances where avoidance of populations/habitat is not possible so that take would occur through impacts to occupied ABB habitat, the applicants would mitigate project impacts as described in the ICP. Overall, impacts to the ABB are considered negligible.

More information on the anticipated impact on the ABB as a result of the Proposed Alternative can be found in Section 3.2 of the ICP. An impacts analysis and estimated incidental take of the ABB is presented in Section 3.3 of the ICP, while minimization and mitigation measures, as well as mitigation ratios, are provided in Section 4.2 of the ICP.

4.9.2 Noncovered Species

4.9.2.1 No-Action Alternative

As noted in Section 3.9.2, several other federally listed species, as well as two species proposed for Federal listing, two Federal candidate species, and the bald eagle are known to occur in the Planning Area. These include one plant, the endangered harperella; five mussels, the endangered Ouachita rock pocketbook, scaleshell mussel, and winged mapleleaf, and the Neosho mucket (proposed for listing as endangered) and rabbitsfoot (proposed for listing as threatened); five fish, the threatened Ozark cavefish, Arkansas River shiner, Neosho madtom, and Leopard dater, as well as the Arkansas darter, a candidate species; one reptile, the alligator (threatened due to similarity of appearance); five birds, the endangered whooping crane, interior least tern, and red-cockaded woodpecker, the threatened piping plover, Sprague's pipit (a candidate species), and the bald eagle, which although not federally listed, is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act; and three endangered mammals, the gray bat, Indiana bat, and Ozark big-eared bat.

In general, under the No-Action Alternative the existing threats to noncovered species are likely to increase throughout the 22-year term of the ICP. The impact on these species would have the potential to cause negligible to minor direct and indirect adverse impacts to populations. Oil and gas companies would continue to build new and maintain existing pipelines, well pads, roads, and other associated facilities such as substations and distribution lines within the Planning Area. New land development associated with population growth in the Planning Area could result in replacement of areas of potential habitat with impervious cover and landscaping that often consists of nonnative vegetation.

For purposes of this analysis, the above-mentioned species have been broken down into the following groups.

Plants. Impacts to the federally listed harperella can be avoided by using the take avoidance measures described on the Service's website[5] and because of its limited distribution, abundance, and/or niche specificity within or potentially within the Planning Area. Also included in this category is the rattlesnake-master borer moth because it is closely associated with the rattlesnake master or button eryngo plant (*Eryngium yuccifolium*). Specific actions to preclude impacts to these species may include, but are not limited to:

- avoiding populations of the species, its habitat, and lands managed for its conservation and recovery in routing new pipelines and siting of new well pads and associated facilities, where possible;
- constructing new facilities, where possible, parallel to existing maintained rights-of-way;
- minimizing soil disturbance caused by oil and gas activities;
- installing and maintaining adequate erosion control measures;
- minimizing (or avoiding altogether) herbicide use for vegetation control and using only appropriate herbicides and application methods that limit impacts on nontarget species (e.g., low-volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence) to minimize the potential risk of herbicide drift into adjacent populations of these species; and
- utilizing some of the measures noted below for aquatic species.

Aquatic Species. These include the five mussel species (Ouachita rock pocketbook, scaleshell mussel, winged mapleleaf, Neosho mucket, and rabbitsfoot); five fish (the Ozark cavefish, Arkansas River shiner, Neosho madtom, Leopard dater, and Arkansas darter); and one reptile, the American alligator. Existing threats to these aquatic species include a decrease in water quality, increased levels of sediments and/or contaminants, low levels of dissolved oxygen, and a reduction in water

[5] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

flows, particularly in springs. Almost all of these species have a limited distribution in the Planning Area. Impacts to these species can be avoided by using the take avoidance measures described on the Service website[6] and because of the limited distribution, abundance, and/or niche specificity of several of these aquatic species within the Planning Area. Specific actions to prevent impacts to these aquatic species may include, but are not limited to:

- avoiding populations of these species, their habitats, and lands/waters managed for their conservation and recovery, in routing new pipelines and associated facilities, where possible and project-appropriate;
- spanning riparian areas and wetlands to avoid impacts where rerouting is impracticable;
- utilizing bridges to the greatest extent practicable;
- where not practicable, avoiding impacts by horizontal drilling under rivers with known populations of these species;
- for all oil and gas activities, adhering to stormwater best management practices to minimize or eliminate the risk that oil and gas activities could exacerbate threats to these species and their habitat, as specified above;
- avoiding impacts to springs, riparian areas, and wetlands;
- avoiding use of herbicides and pesticides in riparian areas;
- installing and maintaining adequate erosion control measures;
- containing onsite hazardous materials such as fuels, lubricants, and other chemicals so that they do not enter waterbodies;
- avoiding storing hazardous materials within 100 feet (30.5 meters) of a stream bank or other waterbody; and
- developing and implementing a spill prevention and response plan to contain fuel and other chemicals on-site.

Birds. These include the whooping crane, interior least tern, red-cockaded woodpecker, piping plover, red knot, Sprague's pipit, and the bald eagle. Impacts to these species can be avoided by using the take avoidance measures described on the Service's website[7]. Specific actions to preclude impacts to these species, as well as to migratory birds, may include, but are not limited to:

- avoiding populations of these species (e.g., individuals, nests, nesting colonies, and cavity trees), their habitats, and lands managed for their conservation and recovery in performing oil and gas activities, where possible and project-appropriate;

[6] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

[7] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

- constructing new facilities, where possible, adjacent to existing maintained rights-of-way;
- spanning riparian areas and wetlands to avoid impacts where rerouting is impracticable;
- minimizing pesticide and herbicide use;
- designing apparatus for flared gases within the Planning Area so that no flames are exposed and the end of the pipe is fitted with devices that deter birds from perching;
- utilizing some of the measures noted above for aquatic species;
- implementing measures listed below if an oil and gas activity is proposed within 1 mile (1.6 kilometers) of a critical component of the bald eagle's life history, such as a nest, a communal roost site, a river, or a freshwater wetland or reservoir covering more than 20 acres (8.1 hectares) in size. These critical life history needs are referred to as Eagle Use Areas (EUAs);
- avoiding locating electric distribution lines in EUAs or burying the lines;
- marking new electric distribution lines with special diverter devices, per Service recommendations in the Aviation Power Line Interaction Committee (2012), if a distribution line cannot be buried in an EUA. As a minimizing measure for the above ground electric distribution lines in EUAs, marking an equal amount of existing electric distribution lines within 1 mile (1.6 kilometers) of other EUAs;
- designing all power poles within an EUA to protect eagles from electrocution risk, following standard practices in the Aviation Power Line Interaction Committee (2012) document referenced above;
- marking new electric distribution lines that cross or are within 1 mile (1.6 kilometers) of potential habitat and an equal amount of existing lines for the whooping crane, interior least tern, piping plover, red knot, and Sprague's pipit with special diverter devices per the Service recommendation in the Avian Power Line Interaction Committee (2012);
- conducting eagle nest surveys prior to activities that may alter potential nest site habitat;
- maintaining a 660-foot (200-meter) buffer for all activities near active bald eagle nests during the nesting season (January–June);
- avoiding clear cutting or removal of overstory trees within 330 feet (100 meters) of eagle nests at any time;
- for other migratory birds, conducting the activity outside the local nesting season;
- minimizing the loss, destruction, or degradation of migratory bird habitat during the local nesting season if activities must occur during that timeframe;
- planning projects well in advance so that clearing of vegetation in the year prior to construction (outside the nesting season) may discourage future nesting attempts of birds in the proposed project area, thereby decreasing chance of take during construction activities;
- completing all disruptive activities outside the peak of migratory bird nesting season;
- conducting searches for nests if disruptive activities cannot be completed outside the nesting season;

- providing the Service with an explanation for why work has to occur during the migratory bird nesting season if a proposed project or action may take migratory birds through disturbance or alteration of nesting habitat, and work cannot occur outside the local nesting season;
- determining whether migratory birds are nesting onsite by conducting initial general surveys of the project area during the best biological timeframe for detecting the presence of the locally nesting birds and therefore potentially at risk from the activity; and
- contacting the Service's Regional Division of Migratory Birds for survey protocol recommendations.

Mammals. These include four species of bats, the gray, Indiana, Ozark big-eared, and the northern long-eared. Impacts to these species can be avoided by using the take avoidance measures described on the Service's website[8]. Specific actions to preclude impacts to these species may include, but are not limited to:

- avoiding populations of these species (e.g., hibernacula, roosting areas, caves), their habitats, and lands managed for their conservation and recovery in performing oil and gas activities, where possible and project-appropriate;
- establishing a buffer of 300 feet (91 meters) around any caves or sinkholes;
- constructing new facilities, where possible, adjacent to existing maintained rights-of-way;
- consulting with the Service if geophysical (seismic) exploration is to occur within the known range of these bats; and
- utilizing some of the measures noted above for aquatic species to protect bat foraging habitat.

Under the No-Action Alternative, any impacts to habitat of noncovered species that are federally listed as threatened or endangered would require authorization through coordination with the Service on a project-by-project basis, if projects have the likelihood of resulting in take. Wildlife in Oklahoma is protected under various local, State and Federal regulations. However, while these regulations would protect noncovered species to some degree, the regulations would not necessarily provide habitat protection.

4.9.2.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative.

Because of their limited distribution in the Planning Area and by using the Species Take Avoidance Measures for Noncovered Species Related to Selected Oil and Gas Projects within the American

[8] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

Burying Beetle Range in Oklahoma described on the Service's website[9], the applicants could avoid impacting these species. For instance, measures to revegetate areas disturbed by covered activities with native species, unless specifically prohibited by the landowner, would likely prevent invasive plant species from colonizing, establishing, and then spreading into adjacent habitats supporting federally listed plant species, where they could outcompete, displace, and extirpate these species. Avoidance of federally listed and proposed species and their habitat would further preclude indirect impacts, such as reductions in prey availability; introductions of invasive species, diseases, competitors, predators, and parasites; and disturbance from increases in vehicular traffic unrelated to covered activities. Should any applicant be unable to avoid take of listed species or impacts to migratory birds and eagles, the applicant would need to consult with the Service to determine how to gain authorization for potential take of these species and ensure compliance with the ESA, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

Impacts occurring to these noncovered species would be negligible to minor throughout the 22-year term of the ICP due to use of avoidance, minimization, and conservation measures and because of the limited distribution or transient nature of almost all of the federally listed and proposed species not covered by the ICP, but potentially occurring within the Planning Area. Though unexpected, where covered activities could take federally listed species not covered under the ICP, the applicants would coordinate with the Service to determine how to gain authorization for take of these species and ensure compliance with the ESA.

The Proposed Alternative would have the potential to cause negligible to minor direct and indirect adverse impacts from covered activities to populations through habitat changes, introduction of nonnative species, and other alterations to the natural balance of terrestrial and aquatic species because more comprehensive avoidance would be accomplished through compliance with the ICP. Furthermore, minimization measures in place for the ABB may collaterally benefit some of the noncovered species, which would then concurrently contribute to their conservation and recovery.

4.10 LAND USE

4.10.1 No-Action Alternative

Under the No-Action Alternative, the oil and gas industry would continue to build new and maintain existing oil and natural gas pipelines, well pads, and associated facilities within the Planning Area.

Land use impacts from activities associated with construction of new facilities are usually determined by the amount of land converted to actual pipeline rights-of-way, well pad sites, and associated oil and gas facilities, and by the compatibility of these areas with adjacent land uses.

[9] http://www.fws.gov/southwest/es/Oklahoma/ABBICP

During the construction of new projects and the maintenance of existing facilities, temporary impacts to land uses within the rights-of-way and associated facilities could occur due to the movement of workers, equipment, and materials through the area. Construction noise and dust, as well as temporary disruption of traffic flow, may also temporarily affect residents and businesses in the area immediately adjacent to the rights-of-way, well pads, and associated oil and gas facilities. Coordination among the applicants, contractors, and landowners regarding access to these areas and construction scheduling would help to minimize these disruptions.

Generally, the most important measure of potential land use impact is the number of habitable structures (i.e., residences, businesses, schools, churches, hospitals, nursing homes) located in the vicinity of pipelines, well pad sites, and associated oil and gas facilities. The least impact to land use generally results from locating new pipeline projects within or parallel to existing rights-of-way and by locating new well pads in already disturbed areas. Use of existing roads as access roads would also help to lessen the impact to land use. The overall length of an oil or natural gas pipeline project can be an indicator of the relative level of land use impacts. During the routing process for new pipeline projects and the siting process for the location of new well pads, the number of habitable structures within close proximity to potential routes and sites can be determined, existing infrastructure identified, and the characteristics of various alternative routes and sites determined, including the length of the alternative pipeline routes, by evaluating aerial photography and existing maps. This information is usually verified in the field where possible. Obtaining land for oil and natural gas pipelines, well pad sites, and associated facilities would require the applicants to acquire temporary and/or permanent easements with landowners along the rights-of-way of future pipelines, as well as for well pad sites, pump stations, and other associated facilities used in the operation of the pipelines. Additionally, temporary effects to land use would include the creation and construction of temporary workspace areas along the rights-of-way of future pipeline construction and adjacent to well pads and other associated facilities. Easements would typically provide compensation to landowners for long-term land use (i.e., well pads, maintenance roads), as well as temporary land use losses (e.g., crop production). Easements would also address restoration of land and/or compensation to landowners if and when unavoidable damage occurs to property. In some instances, land may be purchased instead of using easements. Private roads or access roads would only be used with permission of the landowner or land management agency.

As noted in Section 3.10, the majority of land use within the Planning Area is agricultural (28 percent rangeland, 26 percent pastureland, and 15 percent cropland). Approximately 20 percent of the Planning Area is forest land. Impacts to agricultural land uses from new oil and gas pipeline projects, including well pads and associated facilities such as access roads and electric substations and distribution lines or maintenance of existing facilities are expected to be minor as long as the rights-of-way for easements are not fenced or otherwise separated from adjacent lands. The impacts on the agricultural use of rangeland would be negligible as new pipeline facilities would not interfere with grazing. In addition, in most cases, the impacts on crops would also be minor as new pipelines would be buried underground, allowing for crops to be planted and

harvested following the installation of the new pipeline. The landowners' use of their fields would not be inhibited and the only land not made available for agricultural use would be the area occupied by pipeline pump stations, well pad sites, and any associated permanent access roads and electric substations. Such above ground facilities could be sited in nonagricultural areas to minimize impacts. Most existing agricultural land uses may be resumed within the pipeline rights-of-way following construction. If prime or unique farmlands are irreversibly converted to nonagricultural use, NEPA and the Farmland Protection Policy Act require Federal agencies to consult with the Natural Resources Conservation Service.

Potential impacts to recreational land use include the disruption or displacement of recreational facilities and activities. During the routing and siting process for new pipeline and well pad projects, alternative routes and potential well pad sites are evaluated based on criteria such as crossing/being located in or in close proximity to any designated park or recreation area. Although large tracts of parkland and numerous recreational sites are located within the Planning Area, the applicants would attempt to avoid these lands when routing new pipelines and constructing new well pads, thereby minimizing the amount of such land impacted. In addition, applicants would coordinate with the appropriate government agencies to avoid or minimize conflicts with existing or planned parks and/or recreational areas that are located within their individual incidental take permit areas. These agencies include, but are not limited to the U.S. National Park Service, the Service, U.S. Forest Service, tribal lands, U.S. Army Corps of Engineers, Oklahoma Department of Wildlife Conservation, Oklahoma Tourism and Recreation Department, The Nature Conservancy, and county and local parks and recreation departments. As a result of these measures, parks and recreational areas would largely remain unaffected by the oil and gas activities.

Potential impacts to transportation from new oil and gas projects could include disruption of traffic or conflicts with proposed roadway and utility improvements, and may also include increased traffic during the construction period. Individual projects would generate only minor construction traffic at any given time or location, however. This traffic would consist of construction employee's personal vehicles, truck traffic for material deliveries, concrete trucks for structure foundation work, and mobile cranes for structure erection. These impacts are usually temporary. New pipeline projects would cross multiple U.S. and state highways, and county roads. Applicants would obtain road-crossing permits from the Oklahoma Department of Transportation for any State-maintained roads or highways, which includes U.S. and state highways, and local county governments for county roads, crossed by the pipelines. This would ensure that proposed projects have minimal effect on traffic and roadways within the Planning Area.

New oil and gas projects should not have any potential effect on aviation operations within the Planning Area because aviation facilities would be avoided. Operations and maintenance activities would not affect aviation operations.

The routing and siting process for new oil and gas pipelines, well pads, and associated facilities typically takes into consideration land use plans that have been developed by Federal, regional, State, local, and tribal entities within the Planning Area for a particular project. Through the routing and siting process, potential conflicts with such plans are avoided or minimized to the extent practical, usually routing and siting new facilities to avoid areas with land use or management plans. Thus, impacts to land use through conflict with existing land use plans are not typically expected. In the event conflict cannot be avoided, measures are taken to come to a mutually agreed-upon, project-specific minimization measure to reduce impacts to the extent practical. It should be noted that within the Planning Area, the majority of land is not included in any type of land use plan. Land use plans may be found in incorporated urban areas, areas under conservation easement or in preserves, and State- or federally owned or managed lands. The majority of land within the Planning Area is used as pastureland, rangeland, cropland, or is made up of forest, with much smaller proportions of urban land and Federal/State land.

Two main types of activity occur in the Planning Area: installation and subsequent maintenance of new oil and natural gas pipelines, well pads, and associated facilities, and maintenance and/or repair of existing facilities.

As discussed in Section 3.12, Socioeconomics, the human population within the Planning Area has grown and would likely continue to grow throughout the life of the permit. Population growth would increase residential and commercial land development projects. Such projects would also likely lead to the construction of more roads and utilities or improvements to existing roadways and utilities within the Planning Area.

Not having the ICP and incidental take permits in place would be expected to have little impact on potential effects to land use, which would be insignificant.

4.10.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. Impacts under the Proposed Alternative are expected to provide some level of positive benefits because avoidance, minimization, conservation, and mitigation measures stipulated in the ICP would allow a more consistent and coordinated approach over the entire 45-county Planning Area throughout the 22-year duration of the ICP, instead of working and planning on a localized level as would occur under the No-Action Alternative. No significant impacts to land use are anticipated under the Proposed Alternative because in most cases, post-construction restoration would reestablish preconstruction conditions. In addition, it is estimated that 37,569 acres (15,204 hectares) of the 22,858,163-acre/9,250,370-hectare (35,716-square-mile/92,504-square kilometer) Planning Area would be directly impacted by covered activities.

4.11 AESTHETICS AND NOISE

4.11.1 Aesthetics

4.11.1.1 No-Action Alternative

Under the No-Action Alternative, aesthetic impacts, or impacts on visual resources, exist when pipeline rights-of-way and/or well pads and associated facilities such as roads and electric substations and distribution lines create an intrusion into, or substantially alter the character of, the existing view. The significance of the impact is directly related to the quality of the view, in the case of natural scenic areas, or to the importance of the existing setting in the use and/or enjoyment of an area, in the case of valued community resources and recreational areas.

While the placement of new pipelines would not have the same negative aesthetic impact of an above ground linear feature like a transmission line, construction of new oil and natural gas pipelines could still have both temporary and permanent aesthetic effects, including views of cleared pipeline rights-of-way and the actual assembly and burying of the pipelines, as well as movement of construction workers and vehicles. Hydraulic fracturing at well pads may temporarily increase the amount of trucks and other vehicle traffic at a site. Otherwise, hydraulic fracturing would likely not increase aesthetic effects any more than the standard well pad and drilling equipment. Above ground features such as well pads would also have both temporary and permanent aesthetic impacts and would include views of clearing the site for the well pad and construction of the well pad.

Where wooded areas are cleared, the brush and wood debris could possibly have a temporary negative impact on the local visual environment. However, the visual disturbances associated with construction activities would involve relatively small areas and most would be of short duration, limited to the work or construction timeframe. Permanent impacts from the project would involve views of well pads, pump stations, associated electric substations and/or distribution lines, and pipeline markers at property lines and road crossings, as well as views of the cleared rights-of-way. Depending on specifics of a new project, measures to protect visual resources could include but are not necessarily limited to location of new facilities (for example, well pads are often built on private property and in areas where the general public would have no access), finished grade contouring of the rights-of-way, and landscape design and revegetation of the cleared rights-of-way. Offsite impacts to aesthetics may occur, as cleared rights-of-way and construction/maintenance equipment would likely be visible from roadways, residential areas, parks, and other community facilities.

While both temporary and permanent aesthetic impacts would occur, these impacts would not be significant because many of the pipelines, well pads, and other associated facilities would be located in areas not readily seen by the general public. Additionally, many oil and gas facilities would be sited in areas that contain existing oil and gas infrastructure.

4.11.1.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. To participate in the ICP, applicants must agree to coordinate with managers of existing or planned parks and/or recreational areas, which are typically considered as having high aesthetic value. Siting projects in coordination with these managers would reduce any aesthetic impacts to these areas. In addition, while both temporary and permanent aesthetic impacts would occur, these impacts would not be significant because in order to participate in the ICP, oil and gas applicants must agree to restore any temporarily impacted areas (e.g., revegetation of cleared rights-of-way), Permanent impacts may be less visible to the general public because many of the pipelines, well pads, and other associated facilities would be located in areas not readily seen or in areas with existing infrastructure, thereby not decreasing the visual aesthetics of a specific area. Therefore, impacts to aesthetics is expected to be not significant.

4.11.2 Noise

4.11.2.1 No-Action Alternative

Oil and gas activities are not expected to result in long-term noise impacts, although some permanent noise sources such as well pads, pump stations, and pump jacks may be installed as part of a project. Exploration (seismic) generally results in noise from diesel engines (trucks), thumper trucks (where a heavy weight is raised and dropped to impact the ground), and explosives (dynamite placed between 20 and 250 feet [6 and 76 meters] below ground) could have very loud, short duration noise associated with them. Construction and operation/maintenance activities that involve use of motorized equipment would also result in temporary noise level increases at noise-sensitive receptors, such as residences. Equipment used and duration of oil and gas activities would vary for different activities occurring within facility pipeline rights-of-way, well pads, and associated facilities. In general, except for facilities such as pump jacks, noise levels associated with operation and maintenance activities would be less than those associated with construction activities, would be more periodic, and would be of shorter duration.

Immediately adjacent to pipeline rights-of-way, well pads, and associated facilities, noise could reach high levels during implementation of oil and gas activities due to the use of motorized equipment. However, noise would decrease to more-acceptable levels beyond 400 feet (122 meters). In some areas, depending on surrounding land uses and features, noise related to oil and gas activities beyond 400 feet (122 meters) would not be differentiated from ambient conditions. Noise levels would be higher at receptors immediately adjacent to oil and gas activities compared to those shielded by other structures.

The increase in noise levels would likely result in temporary annoyance at nearby receptors. Increases to ambient noise levels in the proximity of major roadways would generally be more tolerable as compared to noise level increases in more isolated locations. To minimize potential

impacts, equipment used for oil and gas activities would be operated on an as-needed basis and restricted to daytime hours, where not required for safety reasons, to assist in reducing noise annoyance.

Noise impacts from construction activities during pipeline installation and development of well pads and other associated oil and gas facilities would be temporary, minor, and not significant. Hydraulic fracturing and horizontal drilling occurring on well pads and during pipeline construction may increase noise, although these impacts are also temporary. Hydraulic fracturing may require specialized equipment and operation of diesel engines that produce noise may be temporarily required at drilling sites. Additional use of trucks would be required during hydraulic fracturing to deliver and remove water, sand, and other fluids. Noise impacts associated from this equipment would be temporary. Impacts from noise produced by structures such as pump jacks would be permanent. However, siting of these facilities in areas with few people would minimize these impacts; therefore no significant noise impacts are anticipated.

While both temporary and permanent noise impacts would occur, these impacts would not be significant; temporary impacts would be of short duration and permanent noise produced by structures such as pump jacks would likely be minimized because many of these facilities would be sited in areas with few people.

4.11.2.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative and are thus expected to be not significant.

4.12 SOCIOECONOMICS

4.12.1 No-Action Alternative

Under the No-Action Alternative, oil and gas companies would construct new and maintain existing pipelines, well pads, and associated facilities in order to continue to provide reliable energy sources. Minimal short-term local employment would be generated by the construction of pipelines and associated oil and gas facilities because applicants normally use contractors during the clearing and construction phase of their projects that can be based anywhere. However, a portion of the project wages would have a positive effect on local economic activity through local purchases such as fuel, food, lodging, and possibly building materials. Some locals may be employed in the long term once the initial construction is over for operation and maintenance of the pipelines and facilities.

Payments for pipeline rights-of-way easements and for land on which to build well pads and associated facilities would be made to individuals whose lands are occupied or crossed by the oil and gas projects based on the appraised land value, and this would result in increased income to

those landowners. Each applicant is also required to pay sales tax on purchases and is subject to paying local property tax on land or improvements. Since the applicants would only require easements for oil and gas projects, none of this land would be taken off the tax rolls. The cost of permitting, designing, and constructing the projects would be paid for through revenue generated by the sale of associated services.

Minimal short-term local employment would be generated by the construction of pipelines and associated oil and gas facilities because applicants normally use contractors during the clearing and construction phase of their projects that can be based anywhere. However, a portion of the project wages would have a positive effect on local economic activity through local purchases such as fuel, food, lodging, and possibly building materials. Some locals may be employed in the long term once the initial construction is over for operation and maintenance of the pipelines and facilities. These purchases would produce indirect effects within local communities as dollars are spent and circulated, producing local increases in total output, value added employment, and tax base. Thus, oil and gas activities would have a positive impact on socioeconomics within the Planning Area. Direct and indirect impacts to socioeconomic resources under the No-Action Alternative would be minor and not significant within the Planning Area

4.12.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. Direct and indirect impacts to socioeconomic resources from covered activities would be minor and not significant because of the limited amount of road construction, geophysical exploration (seismic), development, extraction, transport, and/or distribution of crude oil, natural gas, and/or other petroleum products and maintenance, operation, repair, and decommissioning of oil and gas pipelines and well field infrastructure allowed under the ICP.

4.13 ENVIRONMENTAL JUSTICE

4.13.1 No-Action Alternative

The precise locations of minority or low-income populations that could be affected by oil and gas activities cannot be identified at this time and whether such activities would have disproportionately high and adverse human health or environmental effects on these populations cannot be determined because the construction, operation, and maintenance of pipelines, well pads, and associated facilities are implemented on an as-needed basis over the broad geographic region that is the 45-county Planning Area. Thus, it would be speculative to identify the location, nature, or severity of specific environmental justice concerns. Similar impacts of development on minority and low-income populations are likely to occur whether or not the ICP is approved and subsequent incidental take permits are issued. However, potentially significant effects would be avoided or effectively mitigated by measures identified for environmental justice in the routing analysis for each new pipeline project and the siting analysis for new well pads and associated facilities. Any

residual effects, and hence any environmental justice concerns, are expected to be minor and insignificant. It can thus be concluded that the requirements of Executive Order 12898 on Environmental Justice would be satisfied.

4.13.2 Proposed Alternative: ICP with a 22-year Duration

Impacts from covered activities associated with Environmental Justice would be the same under the Proposed Alternative as those described for the No-Action Alternative. Impacts would be minor and not significant.

4.14 TRIBAL JURISDICTION

4.14.1 No-Action Alternative

Under the No-Action Alternative, the oil and gas industry would continue to build new and maintain existing oil and natural gas pipelines, well pads, and associated facilities within the Planning Area, including on tribal lands. Land use impacts to tribal lands from oil and gas activities would be similar to that described in the Land Use section above (Section 4.10). During the construction of new projects and the maintenance of existing facilities, temporary impacts to land uses within the rights-of-way and associated facilities could occur due to the movement of workers, equipment, and materials through the area. Construction noise and dust, as well as temporary disruption of traffic flow, may also temporarily affect residents and businesses in the area immediately adjacent to the rights-of-way, well pads, and associated oil and gas facilities. Additionally, temporary effects to land use would include the creation and construction of temporary workspace areas along the rights-of-way of future pipeline construction and adjacent to well pads and other associated facilities. Easements would typically provide compensation to landowners for long-term land use losses (e.g., well pads, maintenance roads), as well as temporary land use losses (e.g., crop production).

The impacts on the agricultural use of rangeland would be negligible as new pipeline facilities would not interfere with grazing. In addition, in most cases, the impacts on crops would also be minor as new pipelines would be buried underground, allowing for crops to be planted and harvested following the installation of the new pipeline. The tribes' use of their fields would not be inhibited and the only land not made available for agricultural use would be the area occupied by pipeline pump stations, well pad sites, and any associated permanent access roads and electric substations. Such above ground facilities could be sited in nonagricultural areas to minimize impacts. Most existing agricultural land uses may be resumed within the pipeline rights-of-way following construction.

Potential impacts to recreational land use include the disruption or displacement of recreational facilities and activities. During the routing and siting process for new pipeline and well pad projects, alternative routes and potential well pad sites are evaluated based on criteria such as crossing/being located in or in close proximity to any designated park or recreation area. In

addition, applicants would coordinate with the appropriate tribes to avoid or minimize conflicts with existing or planned parks and/or recreational areas that are located within their individual incidental take permit areas. As a result of these measures, parks and recreational areas under tribal jurisdiction would largely remain unaffected by oil and gas activities.

Potential impacts to transportation from new oil and gas projects could include disruption of traffic or conflicts with proposed roadway and utility improvements, and may also include increased traffic during the construction period. Individual projects would generate only minor construction traffic at any given time or location, however. This traffic would consist of construction employee's personal vehicles, truck traffic for material deliveries, concrete trucks for structure foundation work, and mobile cranes for structure erection. These impacts are usually temporary, however.

The routing and siting process for new oil and gas pipelines, well pads, and associated facilities typically takes into consideration land use plans that have been developed by tribal entities within the Planning Area for a particular project. Through the routing and siting process, potential conflicts with such plans are avoided or minimized to the extent practical, usually routing and siting new facilities to avoid areas with land use or management plans. Thus, impacts to land use through conflict with existing land use plans are not typically expected.

4.14.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. Some level of positive benefits would be expected from this alternative because avoidance, minimization, conservation, and mitigation measures stipulated in the ICP would allow a more consistent and coordinated approach for the 22-year duration of the ICP. Therefore, no significant impacts are anticipated under the Proposed Alternative.

4.15 CULTURAL RESOURCES

4.15.1 No-Action Alternative

Any construction activity has the potential for adversely impacting cultural resource sites. Under the No-Action Alternative, compliance with all applicable local, state, and Federal regulations pertaining to cultural resources would still occur. The preferred form of mitigation for impacts to cultural resources is avoidance. An alternative form of mitigation of direct impacts can be developed for archeological and historical sites with the implementation of a program of detailed data retrieval. Indirect impacts on historical properties and landscapes can be lessened through careful design and landscaping considerations. Additionally, relocation may be possible for some historic structures. Cultural resources identified on private land may be protected under state and local laws, but the National Historic Preservation Act may not apply within these private lands. Under this alternative, some projects would have a negligible/minor and insignificant impact, while other projects would have a significant impact.

Federal regulations at 36 CFR part 800 set forth procedures that define how federal agencies meet their obligations under Section 106 of the National Historic Preservation Act to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. According to the Secretary of the Interior's regulations for protection of historical and archeological resources (36 CFR 800), adverse impacts may occur when an undertaking may alter, directly or indirectly, and of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Direct impacts to cultural resource sites may occur during the construction phase of the proposed project and cause physical destruction or alteration of all or part of a resource. Typically, direct impacts are caused by the actual construction itself (including clearing and trenching for pipeline projects and clearing and construction of well pads and associated facilities), or through increased vehicular and pedestrian traffic during the construction phase. The increase in vehicular traffic may damage surficial or shallowly buried sites, while the increase in pedestrian traffic may result in vandalism of some sites. Additionally, construction of a pipeline, well pad, or associated facilities may directly alter, damage, or destroy historic buildings, engineering structures, landscapes, or districts. Direct impacts may also include isolation of a historic resource from or alteration of its surrounding environment (setting).

Indirect impacts include those effects caused by the project that are further removed in distance, or that occur later in time, but are reasonably foreseeable. These indirect impacts may include introduction of visual or audible elements that are out of character with the resource or its setting. Indirect impacts may also occur as a result of alterations in the pattern of land use, changes in population density, accelerated growth rates, or increased pedestrian or vehicular traffic. Historic buildings, structures, landscapes, and districts are among the types of resources that might be adversely impacted by the indirect impact of proposed pipelines, well pads, and associated facilities.

4.15.2 Proposed Alternative: ICP with a 22-year Duration

Impacts under the Proposed Alternative are expected to mirror those of the No-Action Alternative. However, to participate in the ICP, applicants must agree to conduct an historical/cultural review of their project site and work with State Historical Preservation Officer/Tribal Historical Preservation Officer to overcome any significant impacts; accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners; and avoid adversely affecting the physical integrity of such sacred sites. Therefore, impacts to cultural resources under the Proposed Alternative are anticipated to be negligible/minor and not significant.

5.0 CUMULATIVE IMPACTS

The Council on Environmental Quality, which implements NEPA, requires the assessment of cumulative impacts in the decision-making process for projects including a Federal action. Cumulative impacts are the incremental impact of activities associated with implementing the Proposed Alternative when added to other past, present, and reasonably foreseeable future activities regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively noteworthy actions taking place over a period of time. Cumulative impacts are most likely to arise when a relationship exists between a proposed alternative and other actions that have occurred or are expected to occur in a similar location or time period, or that involve similar actions. Projects in close proximity to the Proposed Alternative would be expected to have more potential for cumulative impacts than those more geographically separated.

The Federal action, approval of the ICP and subsequent issuance of section 10(a)(1)(B) incidental take permits, does not include the actual construction, operation, and/or maintenance activities proposed to be covered by the permit (covered activities). However, implementation of the ICP by oil and gas applicants would result in the covered activities and have been considered in the impact evaluation in Section 4. The following subsections identify past, current, and reasonably foreseeable future projects and programs related to the undertaking being analyzed (the Proposed Alternative) and provides an evaluation of their combined (cumulative) effects on the environment.

The Planning Area consists of 45 counties in Oklahoma (see Figure 1-1). The duration of the ICP would be for 22 years, and the duration of the subsequent incidental take permits would be up to 22 years. Because of this broad spatial extent, the extended, multidecadal duration, and limitations of available data, exact identification of all specific past, present, and reasonably foreseeable future activities beyond those proposed under the covered activities is not practicable. However, identification of generalized activities and their impacts is possible and can be used with the environmental consequences of proposed covered activities (see Section 4) to analyze their cumulative effect on the environment. Therefore, the cumulative impacts assessment is not entirely project specific or quantifiable, but provides a general overview of past, present and reasonably foreseeable project types within the ICP Planning Area.

5.1 PAST AND PRESENT ACTIONS WITHIN THE PLANNING AREA

As previously noted, the 45-county Planning Area is diverse and includes a variety of topographic, geologic, ecological, and land use features. Portions of the Planning Area have undergone extensive urban or industrial development, while other portions are primarily agricultural and have experienced little development. Major developments have included conversion of native vegetation to agricultural crops or grazing land, urban or rural development, transportation projects, rights-of-way clearing for utilities, and development of industrial facilities, such as oil and gas pipelines, well

pads, and associated facilities. The result is a variety of past and present actions within the Planning Area that have resulted in the existing conditions described in Section 3. Although not all past and present actions within the planning are identified herein, the discussion below details a recent major action with potential to affect the ABB.

The TransCanada Gulf Coast Pipeline Project is an approximately 487-mile (784-kilometer), 36-inch (0.9-meter) crude oil pipeline beginning in Cushing, Oklahoma, and extending south to Nederland, Texas. Approximately 155 miles (249 kilometers) of the pipeline is sited in Oklahoma, with the remainder in Texas. Construction began on August 6, 2012 and the in service date was January 22, 2014. Although the pipeline has initial capacity to transport up to 700,000 barrels of oil per day and the potential to transport up to 830,000 barrels per day, projected capacity for the first year of operation is 520,000 barrels per day to Gulf Coast refineries. Counties within the Planning Area intersected by the Gulf Coast Pipeline include Kay, Noble, Payne, Lincoln, Okfuskee, Seminole, Hughes, Pontotoc, Coal, Atoka, and Bryan counties (TransCanada 2014).

Anticipated impacts from this project to ABB habitat and individuals in the Planning Area were identified in the Keystone XL Project Final Environmental Impact Statement for the Gulf Coast Segment (U.S. Department of State 2011), and subsequently revised in the Keystone Gulf Coast Pipeline Project Final Environmental Assessment (Exp Energy Services 2012) and concurrent HCP (Enercon Services 2012). Both temporary and permanent impacts to habitat and individuals were identified in Creek, Okfuskee, Seminole, Hughes, Coal, Atoka, and Bryan counties, Oklahoma. Anticipated effects include temporary impact to up to 435 acres (176 hectares) and permanent impact to 17 acres (6.9 hectares)of potential ABB habitat by construction, impact to approximately 33 acres (13.4 hectares)of potential ABB habitat by fragmentation due to the permanent alteration of existing cover type (from forest to grassland) in areas that are not already fragmented, and 65 acres (26.3 hectares)of impacts to ABB habitat during operations and maintenance of the project (in addition to the 485 acres [196 hectares]of impacts described above).

The HCP developed for the Gulf Coast Pipeline Project establishes minimization and conservation measures as well as mitigation requirements to minimize and offset adverse impacts to the ABB. Based on the Biological Opinion and incidental take permit (TE-80492A) issued pursuant to 10(a)(1)(B) of the ESA by the Service, incidental take under this project may occur within a maximum of 550 acres (223 hectares)of the Gulf Coast Pipeline Project action area in the form of harm, harassment, and/or mortality over the 50-year permit duration. These impacts were determined not likely to jeopardize the continued existence of the ABB (USFWS 2012b). Benefits to the species would result from mitigation measures developed in the habitat conservation plan, which include purchase of credits from a conservation bank or fund acquisition and management of mitigation lands in amount recommended by the Service in its draft Conservation Strategy for the American burying beetle (USFWS 2012c). At the time of the biological opinion, Keystone had contracted with the Common Ground Capital, LLC (CGC) and WLLL, LLC (WLLL) to develop a Permittee Responsible Conservation Project Site to consist of the 865-acre (350-hectare) “Keystone

McAlester Conservation Area (KMCA)." In parallel, CGC/WLLL planned to develop a conservation bank on the remaining 735 acres (297 hectares) of the Pittsburgh County tract lying adjacent to the KMCA, with this conservation bank designed to provide for future potential ABB species credits needs of various entities (USFWS 2012b). Both actions have been completed for a 1,600-acre (647-hectare) preserve for the ABB.

Additionally, Enbridge, Inc. is in the construction stage on the Flanagan South Pipeline Project. This project includes a nearly 600-mile (966-kilometer), 36-inch (0.9-meter) diameter interstate crude oil pipeline that would originate in Pontiac, Illinois, and terminate in Cushing, Oklahoma, with construction mostly along the route of Enbridge's existing Spearhead Pipeline. Counties within the Planning Area intersected by the Flanagan South Pipeline would include Osage, Pawnee, Payne, and Washington counties in Oklahoma. Initial pipeline capacity will be 600,000 barrels per day, with an anticipated in service date in mid-2014 (Enbridge, 2012). According to the Biological Opinion issued July 24, 2013 by the Service for this project, the Flanagan South Pipeline Project would likely modify 205.5 acres (83.2 hectares) of ABB habitat: 115.5 acres (46.7 hectares) of occupied ABB habitat would be disturbed during construction, and 90 acres (36.4 hectares) of habitat in the ABB range would be disturbed during operation and maintenance activities over the next 50 years. However, most effects to the ABB are expected to be infrequent, of short duration, and reversible, with expected recolonization of almost all of this area and adverse impacts offset through mitigation. Consequently, the Service determined that this project would have a negative effect on the ABB, but would not appreciably reduce its survival and recovery, and as such, would not jeopardize the continued existence of the species (USFWS 2013g).

Enbridge, in partnership with Enterprise, is also constructing the Seaway Twinning Pipeline, a 30-inch (0.8-meter) diameter pipeline that parallels the already completed and operational Seaway crude oil pipeline, an approximately 512-mile (824-kilometer), 30-inch (0.8-meter) pipeline between Cushing, Oklahoma, and the Freeport, Texas area, and a terminal and distribution crude oil network originating in Texas City, Texas. This pipeline is under construction and anticipated to be operational in mid-2014. The pipeline would intersect the following Planning Area counties in Oklahoma: Bryan, Johnston, Pontotoc, Pottawatomie, and Seminole (Seaway Crude Pipeline Company 2013). At the time this EA was published, no publicly available environmental documentation was available for review.

5.2 REASONABLY FORESEEABLE ACTIONS WITHIN THE PLANNING AREA

As previously noted, a comprehensive and quantifiable, project-specific evaluation of all reasonably foreseeable actions within the 45-county Planning Area was not completed in the assessment of cumulative impacts due to uncertainties caused by the broad spatial extent of the Planning Area and the multidecadal duration of the Permit. However, major reasonably foreseeable projects were identified in the Planning Area and include oil and gas development, transportation projects, and

urban growth. Foreseeable oil and gas operations within the Planning Area include several major pipelines, in addition to the continued development of well pads, smaller pipelines, and associated facilities (Paul 2012). The Tallgrass Energy Pony Express Pipeline Project involves the conversion of a portion of an existing 500-mile (805-kilometer) natural gas pipeline and new construction of a 260-mile (418-kilometer), 24-inch (61-centimeter) extension from Lincoln County, Kansas to Payne County, Oklahoma. The nearly 700-mile (1,126-kilometer) pipeline, once completed, will transport from 230,000 to 320,000 barrels per day of light sweet crude oil from the Bakken production area of North Dakota and eastern Montana. Approximately 80 percent of the route will be collocated with existing energy infrastructure. The pipeline route originates in Guernsey, Wyoming, continues southeast through the corners of northeast Colorado and southwest Nebraska, turns south at Lincoln, Kansas, and terminates at an existing petroleum facility in Cushing, Oklahoma. Counties intersected within the Planning Area include Kaye, Noble, and Payne. The project is slated to come online in August 2014 (Tallgrass Energy 2014). At the time this EA was published, no publicly available environmental documentation on this project was available for review.

Another reasonably foreseeable pipeline project within the Planning Area is the Diamond Pipeline Project, which is being developed through collaboration between Valero Energy Corporation and Plains All American Pipeline Company. The proposed project would construct approximately 424 miles (682 kilometers) of 20-inch (51-centimeter) pipeline between Cushing, Oklahoma, and Memphis, Tennessee to transport crude oil produced from the Permian Basin, Bakken Shale, and Mid-continent oil regions. The project is currently being evaluated, which includes route selection. Proposed project timing includes the finalization of engineering plans and permits and rights-of-way acquisition in 2014, initiation of construction in 2015, and an in-service goal of 2016. Planning Area counties currently crossed by the proposed route, from west to east, include Lincoln, Creek, Okmulgee, Muskogee, McIntosh, Haskell, and Le Flore (Peacock 2014). At the time this EA was published, no publicly available environmental documentation on this project was available for review. In addition to present and foreseeable major pipeline projects, smaller oil and gas operations would continue and expand, as would other unforeseeable major pipeline projects over the Permit duration.

Major highway projects throughout the Planning Area include construction of new highways and upgrades to existing highways. Additionally, of the four U.S. Congress-designated National High Priority Corridors located within Oklahoma, two major corridors currently under study are located within the Planning Area. These corridors are the north-south Interstate Highway 35 corridor between Texas and Kansas, as well as the east-west U.S. Highway 412 corridor that runs from Tulsa, Oklahoma, to Memphis, Tennessee (Oklahoma Department of Transportation 2013a).

The Planning Area encompasses all or portions of 9 of the 11 State Planning Regions in Oklahoma. The Census Bureau information shows that between 2000 and 2010 a majority of the counties in Planning Area grew in population by an average of approximately 7.93 percent, ranging from a

population decline of –4.05 in Ottawa County, Oklahoma, to an increase of 27.12 percent in Wagoner County, Oklahoma (U.S. Census Bureau 2010).

The majority of the counties in the Planning Area are projected to grow in population between 2010 and 2040. Overall the Planning Area counties are projected to grow at an average of 20.43 percent. The area with the lowest growth is expected to be Seminole County, Oklahoma, with a decline of –11.3 percent and the highest growth rate of 47.5 percent is expected in Cleveland County, Oklahoma (Oklahoma Department of Commerce 2012a).

Other conservation plans have been, or are being, developed to address the incidental take of federally listed species from future activities not covered under the proposed ICP. A group of 19 wind energy companies, the Wind Energy Whooping Crane Action Group (WEWAG), in coordination with the Service and nine state wildlife agencies, is developing an HCP to address the potential impacts of wind energy development on several threatened and endangered or candidate species in the central US. Species currently included are the whooping crane, the lesser prairie-chicken, the interior least tern, and the piping plover. The proposed WEWAG plan area includes the approximately 200-mile (322-kilometer)-wide whooping crane migration corridor, which overlaps numerous Planning Area counties in Oklahoma (see Table 3-6). These projects would result in the incidental take and mitigation for federally listed species, as well as additional resource impacts.

5.3 EVALUATION OF CUMULATIVE EFFECTS

For evaluation purposes, the resources considered in the impacts assessment have been placed into one of four resource groups, as identified below.

- Physical Resources
  - Geology
  - Soils, Including Prime and Unique Farmland
  - Water Resources
  - Water Quality
  - Air Quality
- Ecological Resources
  - Wetlands
  - Vegetation
  - General Wildlife
  - Covered Species
  - Other Species of Special Interest
- Social Resources
  - Land Use
  - Aesthetics

  - Socioeconomics
  - Environmental Justice
- Cultural Resources

As described in Section 4, an estimated 37,569 acres (15,204 hectares) of the 22,858,163-acre/ 9,250,370-hectare (35,716-square-mile/92,504-square kilometer) Planning Area) may be directly impacted by oil and gas activities. Impacts under the Proposed Alternative would result from covered activities, potentially including an estimated 2,030 miles (3,267 kilometers) of pipeline; 193 miles (311 kilometers) of roads (158 miles [254 kilometers] of permanent roads associated with wells, 30 miles [48 kilometers] of temporary roads associated with wells, and 5 miles [8 kilometers] associated with pipelines); 3,319 well pads (approximately 4 acres [1.6 hectares] each); and 230 miles (3,267 kilometers) of electric distribution lines. However, many of these resources would not be directly affected by covered activities under the Proposed Alternative. However, the Service recognizes that covered activities have the potential to contribute to cumulative effects within the Planning Area. Thus, a brief discussion for each resource group follows.

5.3.1 Physical Resources

Under the Proposed Alternative, implementation of the ICP and issuance of multiple section 10(a)(1)(B) incidental take permits, covered activities would have little effect on physical resources, and as such, would not contribute noticeably to cumulative impacts on physical resources. Under the No-Action and Proposed alternatives, the applicant would continue to build new and maintain existing oil and natural gas pipelines, well pads, and associated facilities within the Planning Area. These facilities generally only affect the physical resources within the construction footprint, such as where the well pads and other facilities are constructed and where actual trenches are dug and pipelines are placed; thus, impacts to these resources from construction of new pipelines, well pads, and associated facilities would be negligible. The applicants would comply with all applicable local, State, and Federal regulations for erosion and sedimentation control as well as for air quality during construction of new facilities. Standard procedures as well as minimization and mitigation measures described in Section 4.2 of the ICP would be utilized during construction and continued maintenance of the applicants' oil and natural gas pipelines, well pads, and associated facilities in order to minimize impacts to physical resources. Implementation of the ICP would be beneficial to physical resources because the protection and management of blocks of native vegetation communities would also serve to protect physical resources in those areas. Thus, the incremental impact from the covered activities would be negligible and as such, would not contribute, or contribute minimally so as to be unnoticeable, to cumulative adverse impacts on physical resources when considering other projects within the Planning Area. In summary, the covered activities would potentially contribute to cumulative impacts in the Planning Area based on assessment of the environmental consequences of proposed

covered activities on physical resources (see Section 4). However, according to this assessment, impacts would be negligible.

5.3.2 Ecological Resources

Under the ICP, alteration and removal of habitat from the covered activities would occur within the Planning Area. Any "take" resulting from the covered activities would contribute to the cumulative impact within the Planning Area. The primary impact of the covered activities to ecological resources would result from site preparation and construction associated with new projects. The construction of some new facilities would result in fragmentation of the existing ecological communities to some degree. Maintenance activities within existing, managed rights-of-way would have much less of an impact on ecological resources than construction within new rights-of-way and associated facilities.

However, the ICP would provide for a streamlined ESA compliance process and a standardized approach to mitigation. Implementation of the avoidance, minimization, and conservation measures described for the Proposed Alternative in the ICP would reduce potential negative effects to biological resources from applicants' projects. Therefore, the covered activities would contribute little to the cumulative impact when combined with past, present, and reasonably foreseeable projects, such as future land development activities, including the transportation projects and urban growth identified above.

Impacts to wetlands from the covered activities are expected to be minimal, since most aquatic features would be returned to preconstruction contours following placement of buried structures. Where impacts are not minimal, mitigation in accordance with Clean Water Act regulations (33 USC §1251 et seq.) would be implemented. For these reasons, little contribution to cumulative impacts on wetlands within the Planning Area is expected to result from implementation of the ICP and the proposed covered activities.

5.3.3 Social Resources

As discussed in Section 3.12, Socioeconomics, the population within portions of the Planning Area has increased by an average of 7.93 percent between 2000 and 2010 (U.S. Census Bureau 2010) and would likely continue to grow throughout the life of the permit based on available population projections by the Oklahoma Department of Commerce, which predict an average growth of 20.43 percent for the Planning Area counties (Oklahoma Department of Commerce 2012a). Some counties within the Planning Area may continue to experience growth while others may not. Cleveland County, Oklahoma, has the highest projected population growth from 2010 to 2040, with 47.5 percent growth and Seminole County, Oklahoma, is predicted to decline in population by 11.3 percent in the same time frame (Oklahoma Department of Commerce 2012a).

As discussed in Section 4.10, population growth within portions of the proposed Planning Area would most likely increase residential and commercial land development projects in those areas. Such projects would also likely lead to the construction of more roads and utilities within the proposed Planning Area. Covered activities resulting from implementation of the ICP and subsequent issuance of incidental take permits would have a positive socioeconomic benefit. This would add to the positive cumulative socioeconomic benefit of other projects in the Planning Area. Installing new oil and natural gas pipelines, well pads, and associated infrastructure is a response to demands for energy resources. Population growth could induce the need for expanded oil and gas production to enable energy supplies to meet growing demands. Therefore, the activities covered by the proposed incidental take permits would be conducted in response to this increased demand, and would be affected by the supply of energy resources and changes thereof, over the 22-year life of the ICP (Edwards et al. 2010). Covered activities may contribute to population growth and increased development, albeit to an unknown extent, but would likely be negligible.

5.3.4 Cultural Resources

Covered activities resulting from the Proposed Alternative (implementation of the ICP and subsequent issuance of multiple section 10(a)(1)(B) incidental take permits), would make varying contributions to cumulative impacts to cultural resources. The applicants typically conduct cultural resources surveys on all new pipeline, well pad, and associated facility projects and some maintenance projects before construction begins, and because pipelines, well pads, and associated facilities can be slightly rerouted or relocated to avoid sites if necessary, impacts are typically expected to be minimal. Some projects, however, may have a significant impact. Impacts to cultural resources sites would be addressed on a project-by-project basis in coordination with the State Historic Preservation Officer. Therefore, the covered activities are mostly expected to make a minimal contribution to cumulative impacts to cultural resources within the Planning Area, although some projects may make a more significant contribution.

5.4 CLIMATE CHANGE AND CUMULATIVE EFFECTS

On October 8, 1997, the Council on Environmental Quality issued "Draft Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to the National Environmental Policy Act." The Council on Environmental Quality guidance calls on Federal agencies to consider, in the context of the NEPA process, both how major Federal actions could influence the emissions and sinks of greenhouse gases and how climate change could potentially influence such actions. Specifically, Federal agencies must determine whether and to what extent their actions affect greenhouse gases. Furthermore, Federal agencies must determine whether the actions they take, the planning and design of Federal projects, may be affected by any changes in the environment that might be caused by global climatic change. The Council on Environmental Quality concluded that "global climate change is a serious environmental concern

which, given the current state of scientific knowledge, must be viewed under NEPA as a 'reasonably foreseeable' impact of continued emissions and changes in sinks of greenhouse gases."

Covered activities resulting from the Proposed Alternative (approval of the ICP, subsequent issuance of multiple section 10(a)(1)(B) incidental take permits, and implementation of the ICP by Permittees) would adversely contribute to the cumulative effects of other past, present, and reasonably foreseeable actions on climate change. Covered activities would result in the direct emission of greenhouse gases from various sources and a reduction of greenhouse gas sinks. Waste gas (e.g., vehicle and equipment emissions, escape gasses from the drilling and hydraulic fracturing process) would result in the conversion of hydrogen sulfide to sulfur dioxide (SO_2) and the formation of other products of combustion including nitrogen oxides (NO_X), carbon monoxide (CO), and carbon dioxide (CO_2) gases that will be emitted to the atmosphere. In addition, the clearing of vegetation in rights-of-way and in construction footprints for pipelines, well pads, and associated facilities would result in the reduction of greenhouse gas sinks. While these potential impacts are known, insufficient information currently exists to accurately quantify these effects in a meaningful manner.

Under the Proposed Alternative, the construction, operation, and/or maintenance of the applicants' oil and natural gas pipelines, well pads, and associated facilities all occur within the Planning Area for a period of up to 22 years. These activities would occur with the same frequency and duration as under the No-Action Alternative and as such would contribute the same adverse impacts to cumulative effects on climate change as under the No-Action Alternative.

The construction and maintenance of oil and natural gas pipelines, well pads, and associated facilities is a long-term project. The facilities constructed would likely remain in place for an extended, but indeterminable lifetime that is expected to exceed the permit duration and which would likely increase as advances in technologies are achieved. As such, the Proposed Alternative has the potential to be impacted by the effects of climate change. Broadly, the U.S. Environmental Protection Agency states that the effects of climate change observed to date and projected to occur in the future, include, but are not limited to increased frequency of heavy downpours and flooding as well as drought, greater sea-level rise, more intense storms, harm to water resources, harm to agriculture, and harm to wildlife and ecosystems. These predicted weather changes have the potential to increase the number of maintenance activities within the Planning Area. However, insufficient information currently exists to determine the specific local or regional effects of climate change, and their impact on the Proposed Alternative.

As discussed in Section 3.12, Socioeconomics, populations within most portions of the Planning Area have increased and would likely continue to grow throughout the 22-year life of the ICP. Population growth within those portions of the Planning Area would likely be accompanied by an increase in fossil fuel consumption and greenhouse gas emissions related to transportation, energy and heat production, commercial and/or industrial production, agriculture, and other activities.

Areas of population growth would experience increased land development, which would also decrease the amount of vegetation and natural sinks within the Planning Area.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The NEPA regulations at 40 CFR 1502.16 require that the discussion of environmental consequences include "any irreversible or irretrievable commitments of resources which would be involved with the proposal should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that this use could have on future generations. Irreversible effects primarily result from the use or destruction of specific resources that cannot be replaced within a reasonable time frame, such as energy or minerals. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as extinction of a threatened or endangered species or the disturbance of a cultural resource.

The issuance of incidental take permits under the Proposed Alternative for covered species during oil and gas exploration or construction, operation, maintenance and/or decommissioning of pipelines, or well field infrastructure would require little to no commitment of irreversible or irretrievable resources. The covered activities of the Proposed Alternative would result in the loss of covered species' preferred habitat within the Planning Area. However, the ICP's prescribed avoidance and minimization measures, as well as mitigation, would help preserve habitat for the ABB; thus, the ABB's viability would not be adversely affected.

The commitment and funding by each applicant for acquisition and permanent management of mitigation properties would be irreversible. The commitment and funding of mitigation and monitoring activities for the duration of the permit would also be irretrievable.

7.0 SHORT-TERM USE OF THE ENVIRONMENT VERSUS LONG-TERM PRODUCTIVITY

This section supports 40 CFR 1502.16 and provides a discussion of the long-term effects of the ICP by evaluating the relationship between the short-term uses of the environment and the maintenance and enhancement of long-term productivity.

The objectives of the ICP involve the need to conserve biological resources in an organized and effective manner with the anticipated construction, operation and/or maintenance activities expected to occur within the Planning Area. Thus, long-term environmental productivity would be maintained through minimization and avoidance measures, and mitigation. Short-term uses of the environment, such as maintenance of facilities and clearing activities associated with new construction, would be accommodated in a manner least likely to result in permanent damage to the Planning Area's natural resources. The long-term result would be an increase in ecological productivity through preservation, management, and maintenance of habitat. Ecological productivity would also be enhanced through the recovery of potentially imperiled species through mitigation for incidental take under the Proposed Alternative.

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Natural Resources Conservation Service – Oklahoma NRCS State Office

National Park Service – Chickasaw National Recreation Area

Federal Highways Administration – Oklahoma Division

U.S. Forest Service – Ouachita National Forest

Oklahoma Department of Transportation – Environmental Programs Division

Oklahoma Department of Environmental Quality – Main Office, Water Quality Division

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Appendix

Summary of Comments and U.S. Fish and Wildlife Service Response